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OCTOBER 1955

VOLUME 30 • NUMBER 10

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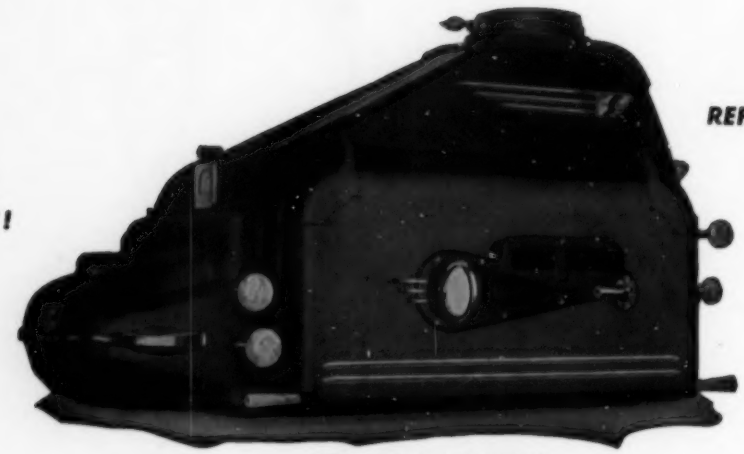

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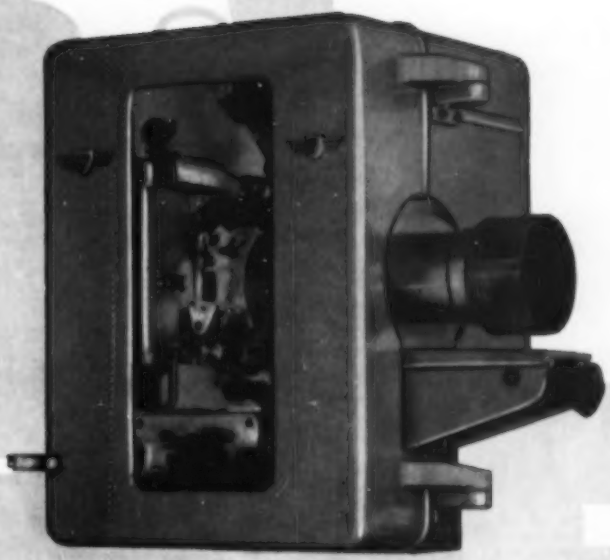

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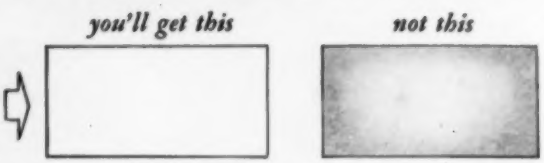

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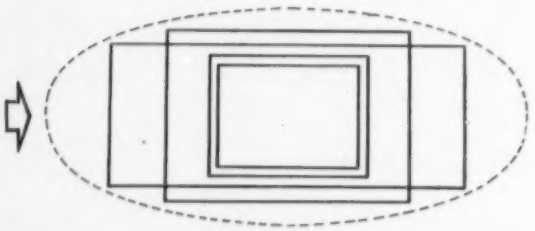

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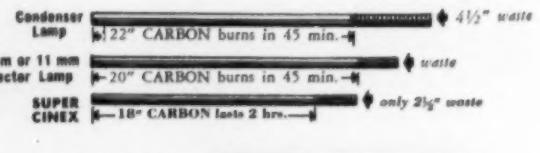
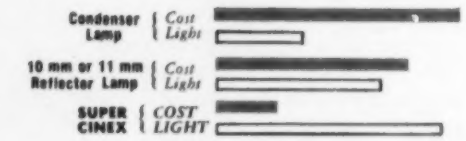


The power consumption is also unbelievably low. Condenser type lamps using 180 amperes with special high cost carbons consume 23 KVA, or more with far less light output, resulting in an hourly cost for carbon and current of $1.60 or more. The SUPER CINEX, when used with our new Multiphase rectifier, reduces this cost to approximately 42c, with an enormous increase in light.



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INTERNATIONAL PROJECTIONIST

R. A. ENTRACHT, *Managing Editor*

JAMES MORRIS, *Editor*

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Monthly Chat

Release Print Confusion Must End

THIS MONTH IP carries a chart prepared by the Motion Picture Research Council which describes the characteristics of *fifteen* different types of 35-mm release prints now available or shortly scheduled for distribution. This chart is a most extraordinary sight indeed. Two thoughts will probably occur to a projectionist when he examines it. First, he will wonder if this imposing variety of prints is necessary. Wouldn't two or three, or maybe four, be enough to take care of anamorphic projection, non-squeezed widescreen pictures, and magnetic and optical sound reproduction? Second, he will be puzzled by the tricky trademarks, supposedly of "new processes."

The conclusion we at IP draw from all this is the obvious one that many of these prints are unnecessary. One gets the impression after examining the chart that some of the studios are jockeying for position and are bent on confusing both the exhibitor and the projectionist.

For example: Although IP often takes issue with 20th Century-Fox over features of their magnetic sound reproduction methods, we think the CinemaScope anamorphic system is a good idea and that it serves a real purpose in providing moviegoers with a visual experience that they can't possibly get on their home Tv sets. We feel at the same time, however, that it is both confusing and downright nonsense for another studio to change this system slightly and call the result a "new process."

Who Steered Us Wrong?

IN A TALK before the recent convention of the SMPTE at Lake Placid, Loren Ryder, the technical chief at Paramount Pictures, who has often contributed interesting articles to IP, declared that "equipment manufacturers who are complaining that sales are off as compared with last year are trying to find ways of getting all of our profit all the time."

Now it is quite true that exhibitors have purchased equipment during the past few years that couldn't pay its way. 3-D equipment is a case in point. There is little or no use now for giant magazines, or selsyn interlocks, or the separate sound reproducers that some theatres installed for the early stereosound.

The question remains, however, of just who are responsible for theatres purchasing this equipment. Was it the equipment salesmen, or was it the Hollywood producers, including those at Paramount, who pushed the 3-D idea hell-for-leather when nobody was sure whether it would really work, or audiences take to it?

We think the studios should accept responsibility for this waste, and we also feel that they are *still* creating confusion and trouble. The Motion Picture Research Council chart, mentioned at the beginning of this column, is proof of that. The old standard of a single type of 35-mm release print is probably gone forever—and good riddance. The old standard was a penny-wise cost-saving device that came close to destroying the industry. On the other hand, if progress is to be made with any degree of smoothness, it is necessary for the studios to restrict themselves at least to those new processes that have something to offer.

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VOLUME XXX OCTOBER 1955 NUMBER 10

The Todd-AO System: A Projector For Both 70- and 35-mm Film

By JAMES MORRIS

The American Optical Co. and Philips of Eindhoven cooperated to design this versatile projector. The system is an example of the new trend toward "roadshow" motion picture exhibition.

TODD-AO, which is probably the most ambitious single-projector motion picture system ever devised, was unveiled to the industry on the 12th of this month when the new film, "Oklahoma," opened at the Rivoli Theatre in New York City. Since IP went to press before this premiere, it is impossible to give any evaluation of the screen image obtained with the 70-mm Todd-AO equipment, or the audience reaction to its giant-sized, deeply-curved picture. That will have to wait for next month.

However, fairly detailed information is now available on the equipment used in the Todd-AO setup, and projectionists will want to know about this equipment as soon as possible. The Todd-AO system is a prime example of the new "roadshow" trend in the American motion picture business.

As of now, it seems likely that within a few years American indoor theatres will be divided into two categories. One group will include a number of de luxe houses equipped with projection machinery of the Todd-AO variety for roadshow (two-a-day) presentation of special and elaborate films. The other group, which will remain the vast majority, will continue to use 35-mm projection equipment of substantially the same character as that now available.

For 70- and 35-mm film

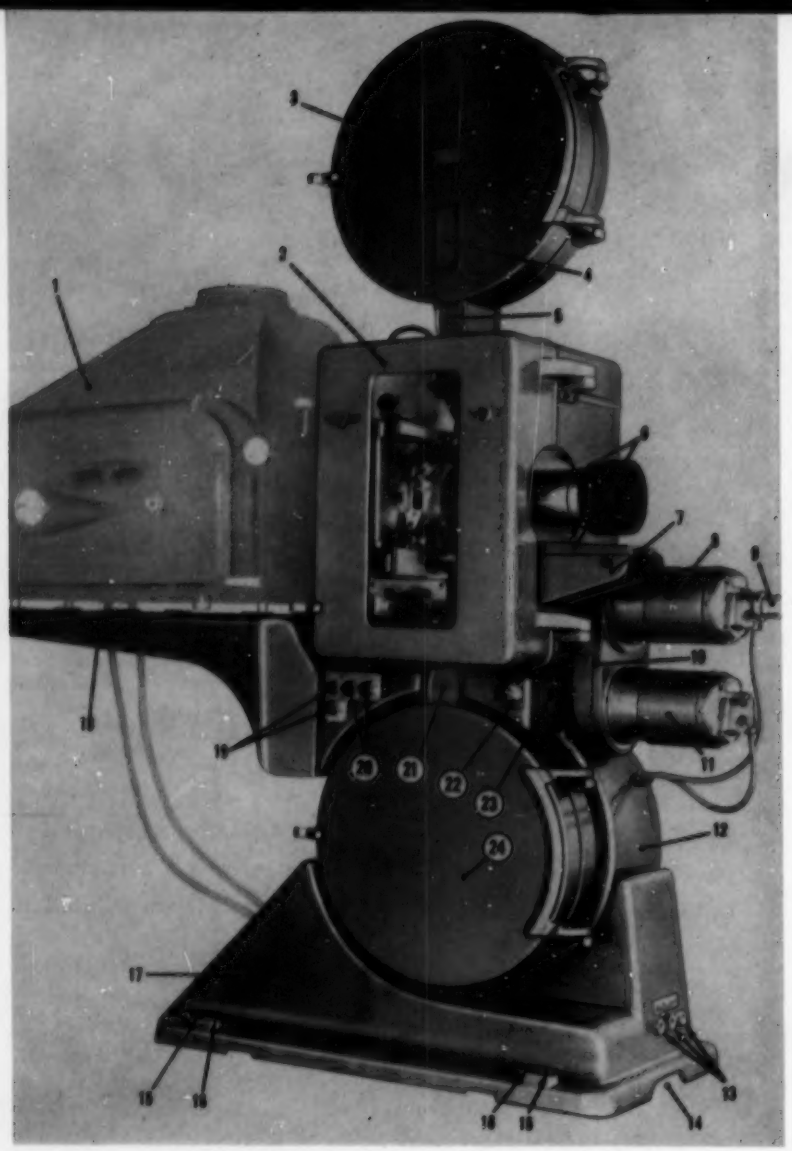
The Todd-AO projector is designed for 35- as well as 70-mm film. By switching a few parts in the projector head, it can be made to accept 35-mm prints and pick up either standard optical sound or CinemaScope magnetic sound. It will not only equip de luxe theatres to show films in a spectacular way, but also in just about any way that a desirable picture happens to be printed.

Although it has many new optical, mechanical and electronic features, the Todd-AO system used for "Oklahoma" relies basically on the big film image for its effectiveness. There is nothing new about this idea. It was used back in the Twenties for the Grandeur process. The VistaVision horizontal projector, introduced last year by Paramount Pictures and the Century Projector Corp., obtains a greatly-enlarged film image by turning a 35-mm film strip on its side and pulling it sidewise through the special projector.

It has been clear for the last two years that a screen image of the highest quality is difficult to obtain on very large indoor screens because of the tremendous magnification required of the 35-mm film frame. This is true not only with the cropped wide-screen aperture for non-anamorphic pictures, but also of the larger CinemaScope aperture. Consequently, 20th Century-Fox is now making 55-mm prints of some CinemaScope features scheduled for roadshow presentation.

High-quality 35-mm projection equipment can give good results on screens up to as much as 50 feet in width, but this equipment is just not up to the job of providing quality performance on screens of this size or larger in indoor theatres.

One of the most interesting refinements of the Todd-AO system is a distortion-correcting printing process developed by Dr. Brian O'Brien, of the American Optical Co. (This is where the AO in Todd-AO comes from.) The corrective-printing proc-



This is the new Todd-AO projector for both 70-and 35-mm film. The projector head is manufactured by Philips of Eindhoven, in Holland, and the rest of the machine and the special lenses required for the Todd-AO system are produced in the United States by the American Optical Co. Features of the new projector, indicated by number, are as follows: (1) arclamp; (2) projector head; (3) upper magazine; (4) window; (5) upper fire trap; (6) CineApergon objective lens and mount; (7) lens mount bracket; (8) upper motor; (9) inching knob; (10) belt housing; (11) lower motor; (12) upper base; (13) water line connections; (14) cutout for electrical leads; (15) hold-down screws; (16) leveling screws; (17) lower base; (18) arclamp bracket; (19) arclamp push button switches; (20) motor push button switches; (21) lower fire trap; (22) motor selector switch; (23) connector hole, optical sound cable, and (24) lower magazine.

ess, which is roughly described in an accompanying illustration, is asserted to eliminate image distortion that would otherwise be present on a giant, deeply curved screen when projection is from a steep angle. According to a recent American Optical Co. announcement, it basically employs an optical method of distorting the print in processing so that the optical distortion inherent in the type of projection mentioned above is counterbalanced.

Three types of distortion will be corrected, it was stated — keystone distortion, distortion resulting from a deeply-curved screen, and distortion resulting from the use of extreme wide-angle lenses in both photography and projection. Two classes of prints will be processed. One class will be corrected for projection angles of from 10 to 15 degrees, and the second for still higher projection angles.

The Todd-AO projector is an unusual machine designed to handle multi-channel sound for Todd-AO, 35-mm magnetic sound for CinemaScope, or conventional optical sound. All three types of sound pickup are provided for inside the projector head. The only action that need be taken when changing from one type of sound to another is to thread the film through the desired soundhead. Even sound on separate film can be used by means of a selsyn synchronizer which is available on an optional basis.

The Peerless Hy-Candescent condenser arclamp, manufactured by the J. E. McAuley Co., of Chicago, is used with the Todd-AO projectors at the Rivoli Theatre in New York. These lamps are equipped with a new type of water-cooled jacket for the positive carbons. These jackets are made by the Hal I. Huff Co., of Los Angeles.

The projector is said to be adaptable to a wide variety of arclamps, but only certain high-powered lamps are recommended at present. The tilting mechanism of the projector rotates at a high point so that there is only a slight change in the center of gravity when it is tilted up or down. Projection angles as far down as 28 degrees and, for drive-ins, as far up as 20 degrees can be reached.

Other features include a centrifical switch to drop the dowser if the film speed is too low, a water flow switch to cut off the arc if the water-cooling equipment fails, and stop switches on both sides of the chassis. The optical preamplifier is of a special plug-in design so that a new unit can be substituted quickly in case of breakdown.

Mechanism Water Cooled

The projector is water-cooled, but it contains no air cooling other than the fanning action generated by the shutter. The film gate is slightly curved above and below the aperture for the purpose of counteracting the tendency of film to buckle under heat.

A single-bladed shutter revolves twice through the film path for every frame of film. Todd-AO engineers claim for it a light-transmission efficiency of over 50%. Two separate motors are provided to drive the mechanism at 30 and 24 frames per second, depending on whether 70-mm or 35-mm film is being projected. For reasons to be given later in this article, a speed of 30 frames per second is used for 70-mm film. Two motors are employed, rather than one plus gears, because this arrangement is said to provide quieter operation with a minimum of gear complexity.

The projector mechanism is manu-

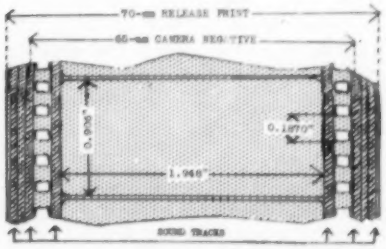
factured by Philips of Eindhoven, in Holland, but the rest of the unit, including lenses, base, magazines and other parts, are produced in the United States by the American Optical Co. Both companies cooperated in the design of the projector.

Screen Design Problems

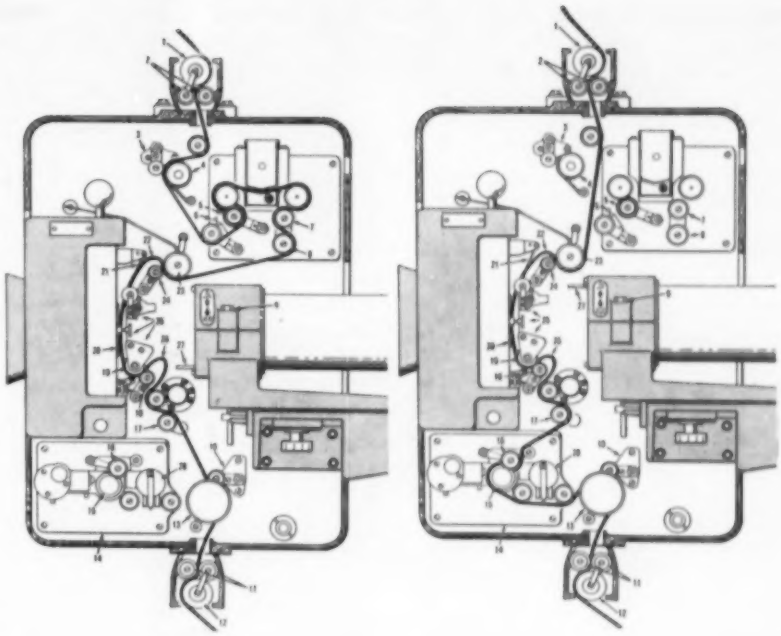
The screen specified for the system is deeply curved and large. According to Todd-AO engineers, use of such a screen posed two problems — re-illumination, and maintaining an adequate level of screen brightness. They use the word re-illumination to describe what happens when light shining on one section of a deeply-curved screen scatters to another part, merging colors and reducing contrast. The brightness problem was felt to be partly solved by the large Todd-AO aperture.

The screen selected has a moulded plastic surface with differently angled lenticulations along its width. The screen is coated overall with aluminum. The lenticulations, or concave reflecting surfaces, are so designed as to reflect light striking any portion of the screen's curvature so that it is reflected only to the auditorium and not to the other side of the screen, it is reported. To accomplish this, the lenticulations must have a different reflective angle at the sides of the screen compared with those near the center.

As a result, the screen must be constructed of a varying number of vertical sections, the number varying with a particular installation. About 12 are used in New York. Seams of the screen are joined in the rear by Fibreglas tape, and are said to be nearly invisible to the audience and a distinct improvement over those in the vertically-sectioned and lenticulated Miracle Mirror screen manufactured by 20th Century-Fox during the early days of CinemaScope.



Seen here is a drawing of the 70-mm Todd-AO print film. The wider areas of sound striping outside the standard-size sprocket perforations each carry two magnetic sound tracks. The more narrow stripings inside the sprocket holes each carry one track. The total is six sound tracks.



Shown above is the interior of the Todd-AO projector head. At left is shown the film path when 70-mm film is used with Todd-AO magnetic sound. At right the projector is threaded for 35-mm film and optical sound. Components of the machine are identified by number as follows: (1) and (2) upper fire trap guiderollers, (3) upper pad roller, (4) upper feed sprocket, (5) nylon pressure roller, (6) tension indicator, (7) piloting guide roller, (8) adjustable guide roller, (9) lens mount clamping bolt, (10) lower pad roller, (11) and (12) lower fire trap rollers, (13) hold back sprocket, (14) optical sound unit, (15) sound drum, (16) pressure roller, (17) guide roller, (18) lower film gate pad roller, (19) intermittent sprocket, (20) aperture plate, (21) pressure bands, (22) upper loop, (23) intermediate sprocket, (24) upper film gate pad roller, (25) film gate, (26) lower loop, (27) lens mount lever, (28) exciter lamp housing.

Although screen manufacturers regard the lenticulated screen as a very good idea, it has been little used since the Miracle Mirror days. The embossing process was found difficult on a mass production basis, according to one screen manufacturer, and the exact directional reflective quality difficult to guarantee.

The Todd-AO lenticulated screen, which overcomes previous difficulties with this type of screen, is manufactured by the Textileather Division of the General Tire & Rubber Co., Toledo, Ohio. The lenticles of the screen are embossed by means of machinery developed by the American Optical Co. Each lenticle is about 0.50″ high and 0.33″ wide, and they vary in spacing and in angle across the screen.

Special wide-angle projection lenses are required for the Todd-AO process. Manufactured by the American Optical Co. and known as Cine-Apergons, these lenses have specially-designed aspherical surfaces on some of their elements. Without these lenses, it is reported, the optics would have been the weak point in the system.

Ordinarily, a lens is made up of a number of concave or convex elements whose surfaces follow a spherical or truly circular arc. In an aspherical design, a lens may contain elements with surfaces that follow, for instance, an ellipsoid pattern. The purpose of this departure from the usual design is to solve an unusual or difficult optical problem.

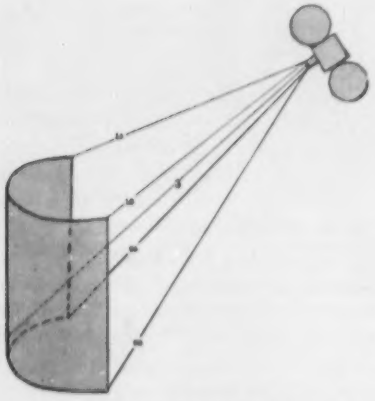
"Oklahoma," the first Todd-AO feature, was photographed on 65-mm Eastman Color negative, and is being shown on 70-mm Eastman Color prints, the extra 5-mm of space on the print is required to make room for the magnetic striping of the 6-channel magnetic sound that is being used.

Film frames are not only larger in the Todd-AO system, but they move faster — at a rate of 30 frames per second. This change was considered

necessary because the human eye is very sensitive to movement and flicker that occur at the edges of a wide field of view. The eye, therefore, is more conscious of flicker that occurs on the edges of a wide screen than it is of flicker at the center of the screen. Flicker also becomes more perceptible as the light level on the screen increases.

The designers of the system say that they were presented with a choice between a dim picture without apparent flicker, a bright one with flicker — or a greater frame frequency, which would permit a bright picture without flicker. The last was chosen even though it meant a considerable departure from conventional design for a theatre projector. The 30-frame-per-second speed also has the advantage of making action on the screen smoother during fast movement.

A sound reproduction system which is both complicated and versatile has been designed to reproduce the six magnetic tracks used in the Todd-AO system. This equipment will also accept any type of 35-mm sound system now in use.



The above diagram shows why a distortion-correcting printing process, one of the features of the Todd-AO System, was felt to be required. This printing method will counterbalance the distortions inherent in projection on a deeply-curved screen from steep projection angles. 1A, 1B, 2A and 2B indicate portions of the image striking the four corners of the screen. The lines at bottom must travel further and will therefore spread more than the lines at the top, causing the familiar keystone distortion. Observing line 3 will show that this distortion is even further compounded by the fact that portions of the image striking the center of the screen will always hit lower than portions striking the edge. By means of simple test patterns, an accompanying diagram shows how this distortion looks on the screen and how the Todd-AO people plan to correct it.

Sound for the performances at the Rivoli Theatre in New York City is obtained from a separate sound film which contains six tracks and is synchronized to the projector by means of a selsyn interlock. However, the Altec Service Co. is now beginning delivery of a switching-relay-equalizer rack designed for the Todd-AO system which will enable the projector to handle sound-on-film reproduction of the 6-track Todd-AO system plus the sound carried on all magnetic and optical prints. Orders for this relay rack have been received for 50 theatres throughout the country.

How Altec Panel Functions

The Altec panel provides individual equalization and level balancing controls — screw-driver operated — for 20 magnetic tracks. On a two-projector installation, the facilities allow setting the six Todd-AO channels on each projector for identical quality; likewise the four CinemaScope channels on each machine. In addition, a compact equalizer is provided for adjusting the Perspecta-optical channel response. For a third projector, a somewhat similar panel appears lower on the rack.

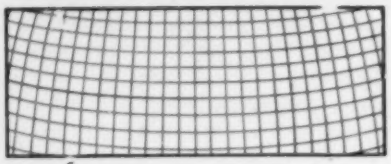
The system thus becomes fully compatible with any of the present-day regular theatre sound systems, capable of reproducing, in conjunction with the Todd-AO projector, all regular release prints.

The Altec-Todd-AO SRE rack contains seven separate panels, with the entire assembly housed in a ventilated heavy steel cabinet. Providing quick and easy access to tubes, fuses, and other components is a heavy door, with air vents top and bottom. The door protects against accident or tampering, and allows for concealed wiring and cabling.

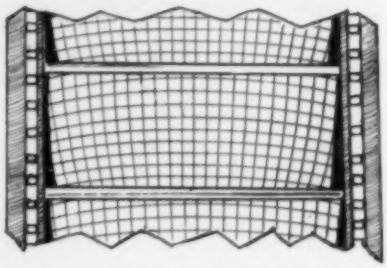
The foregoing was a summary of the information available at press time on the equipment used in the Todd-AO system. As was said at the beginning of this article, no critical evaluation of the process can be given until it is possible to view "Oklahoma" on the screen and judge the performance of the equipment under regular operating conditions.

There is, however, one question about the Todd-AO system that can be raised now because it relates to a doubt voiced by IP over the last two years — this question is on the value

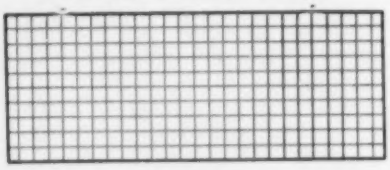
Distorted Screen Image



Distortion-Correcting Print



Corrected Screen Image



The top section of this drawing shows how straight horizontal and vertical lines are distorted by keystone and screen curvature. Distorting a print in processing so that vertical and horizontal lines would take the shape shown in the film strip at center could counterbalance this distortion and provide straight lines on the screen shown at bottom even though that screen be curved. These diagrams are not meant to be an exact description of the Todd-AO corrective printing process. Their purpose is to explain in simple language how it works. In addition to the two types of distortion mentioned above, the Todd-AO method also corrects a print for distortion caused by the use of extreme wide-angle lenses in photography.

of a deeply curved screen. The screen used at the Rivoli Theatre in New York is 63 feet wide, 27 feet high, and curves to a depth of 13.3 feet. The chord of the screen (the distance from one edge to the other) is just over 50 feet, presenting viewers with an effective aspect ratio of approximately 2/1.

In a recent announcement, the Todd-AO Corp. stated as follows:

"Another aspect of the deeply curved screen is its freedom from squeezed images. Most theatre-goers are familiar with the strange elongated narrow figures that are seen from the side seats in the front row. This effect,

(Continued on page 34)

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SMPTE Survey of Drive-In Theatres

By FREDERICK J. KOLB, JR.
Chairman, SMPTE Screen Brightness Committee

Twenty-six outdoor theatres surveyed to assemble data on the effectiveness of projection equipment. Following are abstracts from the committee report.

PREVIOUS STUDIES of screen brightness in indoor theaters extending over a period of 15 years have been instrumental in setting screen-brightness standards, the latest of which was published in 1953.

But during the last 10 years the drive-in theatre was developed and has grown so that this type of exhibition now accounts for about 23% of all the theatres in the U.S. and at least 20% of the boxoffice gross.

From the very first, however, the drive-in theatres have been different in many important ways from the indoor theatres. They have operated consistently with lower screen brightnesses—partly for lack of practical means for putting enough light on the screen.

Inasmuch as there has been very little data on either trade practice or the requirements for good viewing in drive-in theatres, these theatres have been, until now, excluded from consideration when screen-brightness standards were drawn up.

During the past year and a half the Screen Brightness Committee has been making measurements in a small group of drive-in theatres, in order to begin the accumulation of quantitative information.

Considerable data about each of 26 theatres were noted in order to have sufficient information to plan a more extensive survey if that should be desirable, to list the practical operating problems of drive-in theatres and to assess the possibilities for changes in existing theatres. These observations may be grouped under the following general headings:

(1) Screen brightness including light distribution on the screen, variations between projectors, screen reflectivity, and directional performance.

(2) Geometric characteristics including theater size, screen size, aspect ratio and viewing angle.

(3) Equipment characteristics including light source and power supply, picture mechanisms and projection methods.

Some of the factors which now seem most significant are summarized in this report.

Figure 1 summarizes industry information on the distribution of all U.S. drive-in theatres according to capacity. Figure 2 gives this same information for the theatres covered in our preliminary survey.

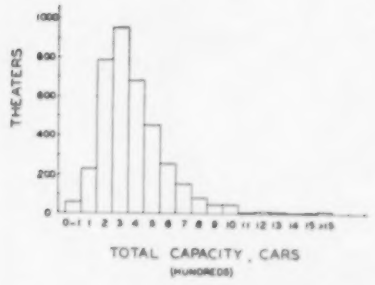

FIG. 1. This is a breakdown of drive-in theatres according to size. The numerals on the left represent theatres. The figures underneath each bar indicate the capacity of a theatre when multiplied by 100. For example: The third bar from the left represents the number of drive-ins of 200-car capacity. Checking the numeral on the left of the top of this bar shows that there are slightly less than 800 of these. This graph was prepared from a nationwide breakdown, including all drive-ins. The succeeding graphs were prepared from the SMPTE sampling of 26 theatres.

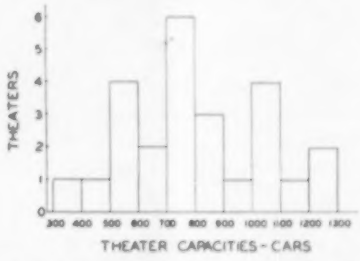

FIG. 2. This graph shows how the 26 theatres included in the preliminary survey vary according to size. Here the figures at left indicate the number of drive-ins as above, but the figures at bottom need not be multiplied.

Figure 3 tabulates screen width in theatres measured while Fig 4 presents the aspect ratios of these screens. It will be seen that some very large screens were measured but that for the most part there were relatively few theatres, at the time of these measurements, converted to the high aspect ratio.

The Committee believes the specifications for these 26 theatres show them sufficiently representative to define the general features of drive-in picture presentation.

Brightnesses measured at the centers of the screens in these drive-in theatres are summarized in Fig. 5. This curve will be found to have no similarity at all to the brightness distribution in indoor theatres. American Standard Ph22.39-1953 specifies a brightness between 9 and 14 foot-lamberts *for indoor theatres;* actually 50% of the indoor theaters measured in 1950-51 fell within this standard, 26% were below the standard, and only one out of 125 indoor theatres was below 4 foot-lamberts. In the drive-in group on the other hand the brightness is 3.0 foot-lamberts and 82% are below 4 foot-lamberts. There was no drive-in theatre measured with a screen brightness in the 9-14 foot-lambert range.

Figure 6 presents the screen reflectivity in the various theatres, indicating a wide range of screen sur-

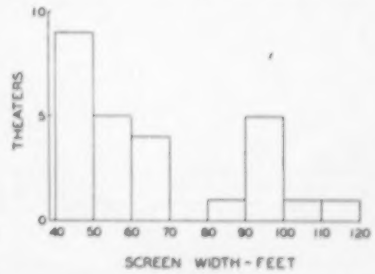

FIG. 3. Screen widths of the 26 drive-in theatres measured are represented here. The figures at left indicate the number of theatres, and the figures at bottom show the width of the screen.

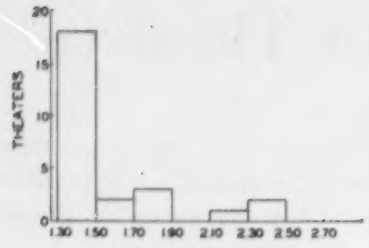

FIG. 4. Screen aspect ratios of the theatres surveyed are shown. For example: The first bar represents the ratio 1.30/1 to 1.50/1.

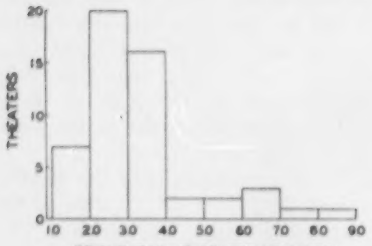

FIG. 5. Screen brightness data from 26 drive-in theatres measured during 1953 and 1954. Numerals at left indicate number of theatres. Numerals at bottom represent brightness at center of the screen in foot-lamberts. For example: First numeral is 1.0 foot-lamberts, the second 2.0, and so on. A decimal point should be understood to exist before the zero in each number.

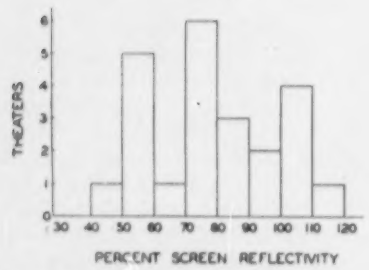

FIG. 6. Screen reflectivity in the drive-in theatres surveyed. Figures at bottom indicate percentages. Values over 100% indicate directional screens. Values below 60 or 70% imply deteriorated or dirty surfaces.

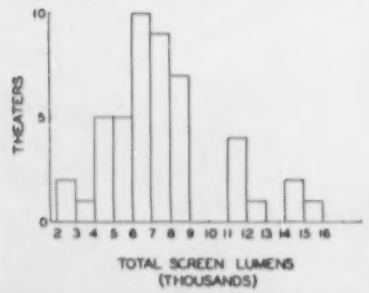

FIG. 7. Total screen lumens output from projectors in the drive-in theatres surveyed. Figures at bottom indicate thousands of lumens with projector and shutter running.

faces from directional through matte and on down to inefficient surfaces that should be replaced. Figure 7 summarizes the total screen lumen output measured with the projector and its shutter running. These data indicate a range in projection equipment and in performance of this equipment all the way throughout the complete output range to be found in indoor theatres.

Much Low-grade Equipment

It is apparent therefore that the large screen size is not alone responsible for low screen brightness in drive-in theatres. There is a great deal of low-output equipment used in the smaller theatres, as if low screen brightness had been a design objective.

Specularity of the projection screen was inferred from the data of Fig. 6, where at least 20% of the theatres measured showed higher screen reflectivities than would be provided by matte screens. Further information is given in Fig. 8. where the screen brightness at approximately 18 degrees off the axis is expressed at a percentage of the brightness when viewed along the axis. Values significantly below 100% identify screens which are specular, and which at the same time tend to show a brightness fall-off within the audience viewing area. More than 20% of the theatre screens in Fig. 8 show such fall-off.

Much of the discussion of drive-in viewing centers on the apparent size of the screen from the audience position, or in other words the angle which the screen subtends at the observer's eye. Figure 9 presents an average condition—the horizontal angle subtended by the screen width when viewed from the center of the middle ramp. Approximate maximum and minimum values are shown in Fig. 10, where this subtended angle has been plotted for viewing from the center of the first and last ramps respectively. It will be noted that the actual screen widths used in drive-in theatres may carry a misleading impression, because they are viewed from such great distances as to "surround" the audience much less successfully than the smaller screens of indoor theatres.

Somewhat similar conditions enter into the selection of a screen size for a given theater. Figure 11 indicates

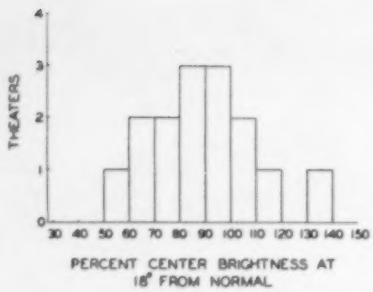

FIG. 8. This graph shows fall-off in brightness when a screen is viewed from an angle of approximately 18 degrees from the normal. Screens showing a fall-off at an angle from the projection axis are usually simple directional types. This fall-off means that patrons toward the side of the theatre see a picture that is less bright.

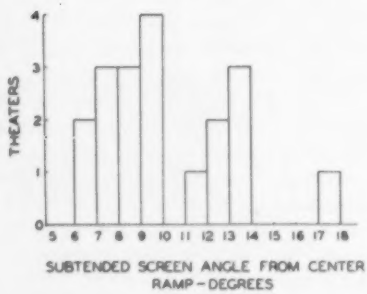

FIG. 9. This graph measures the subtended screen angle from the center ramp. If an observer at the middle of that ramp, which is halfway back in the theatre, looks first at the left and then at the right of the screen, his eye measures the subtended angle. A large angle means that the screen seems big to the observer, a small angle means that the screen seems small.

the relationship between screen size and theater capacity in this survey, as feet of screen width per 100 cars capacity.

These data are presented without evaluation because there are no generally accepted standards of performance for drive-in theatres. This preliminary survey has been intended not to rate the performance of existing drive-in theaters but rather to begin the consideration of factors important in setting desirable standards.

Psychological Differences

Data so far indicate that picture viewing in drive-in theatres is in many important respects different from viewing in the indoor theaters. Not only are the physical characteristics of the theatre different but also the psychophysical audience viewing

(Continued on page 34)

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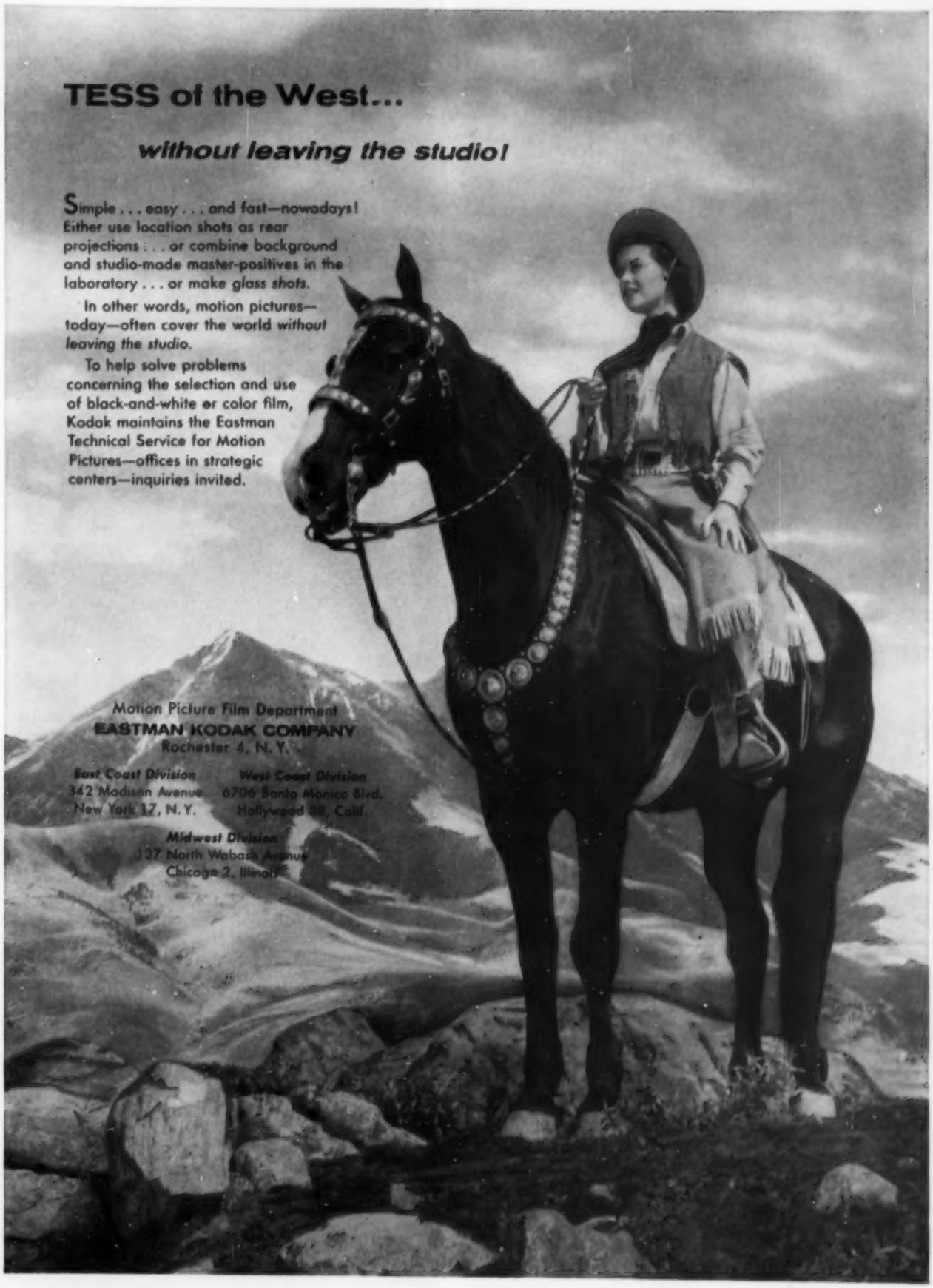

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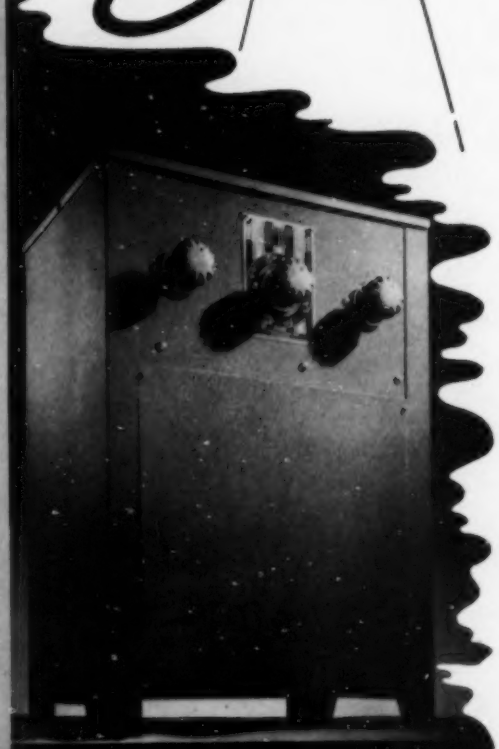

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Recent Trends in Shutter Design For Theatre and Tv Projection

By ROBERT A. MITCHELL

The special shutter problems of Tv projection are stressed in this concluding installment of a two-part series. Also provided are some suggestions for checking the condition and adjustment of theatre shutters for highest efficiency.

THE REQUIRED average of 2½ scannings per frame of motion picture film is realized in television practice by scanning one frame twice, the following frame three times, the next frame twice, and so on. This so-called 2-3-2 "frame-timing sequence" makes possible the lifelike reproduction of 24 frames-per-second films *via* 60 fields-per-second Tv transmission.

It might be thought that special projectors having a 2-3-2 intermittent pulldown are mandatory for Tv film pickup. Such is not the case, even though 2-3-2 projectors are preferred and enjoy very wide use. Ordinary projectors having regular film pulldowns may also be used, providing that the pulldown ratio is 5:1 or faster, and if a specially phased shutter is substituted for the regular projector shutter. As shown graphically in Fig. 2, standard theatre machines having 3:1 geneva movements are useless for Tv film pickup, and even 4:1 movements are not quite fast enough.

The reason for all this resides in the scanning process involved. The picture "flashed" upon the photoelectric mosaic of the camera tube (which serves as the screen) during the 1/600-second *vertical-retrace blanking periods*. These short periods are repeated at the rate of 60 per second —the Tv field rate.

The Latent Image

The light-sensitive mosaic screen of the pickup tube remains dark during the comparatively long lapse of time (3/200 second) between the blanking periods, the picture having been cut off, or "occulted,"* by the revolving shutter of the projector. These relatively long lapses are the *scanning periods* in which the *latent picture image* (consisting only of various degrees of electrical charge corresponding to areas of light and dark in the picture) is converted into a fluctuating electric current, called the "video signal," by the scanning beam in the pickup tube. The sharply focused electron beam traces out line after line until the entire surface of the mosaic has been scanned, and the latent image transmitted.

*The word "occulting" means to hide. It is used by engineers to describe the action of the shutter in concealing the film during the pulldown period.

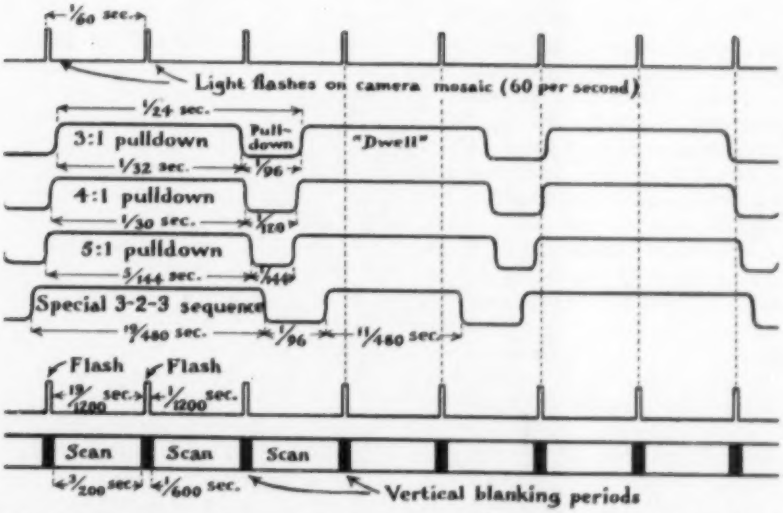


FIG. 2. Timing of film-pulldowns and exposures (1/1200-second "flashes") for Tv film pickup. Note that the picture is projected very briefly only during the vertical-retrace blanking periods, and that the latent image thereby produced is scanned in the dark. While a special intermittent having a 2-3-2 pulldown sequence is desirable, any projector having a 5:1 pulldown ratio may be used. Most 16-mm projectors have this rapid pulldown ratio. As the diagram shows, 3:1 movements cannot be used for Tv film pickup.

Now, actual projection of the film-photographs upon the mosaic of the camera tube lasts for only 1/1200 second during each 1/600-second vertical-retrace blanking period. Even though these very brief exposures may be obtained through the use of a correctly timed flashing bulb in the projector lamphouse, without any shutter, it is more common to employ constant illumination and a specially phased revolving occulting shutter.

In order to produce 60 exposures per second while the film is run at the standard rate of 24 frames per second, the shutter of the Tv projector must revolve *5 times every 2 frames*, if it have a single opening for the light to pass through, or *5 times every 4 frames*, if it be a 2-blade shutter with two openings.

To obtain exposures of the proper duration (1/1200 second), the 1-opening shutter revolving at a speed of 60 rps. must have an 18-degree opening. The 2-opening shutter, revolving half as fast, must have two 9-degree openings. Both shutters have a transmission factor of 5%, or only 0.1 of the light-passing efficiency of the usual theatre-projector shutter. (Fig. 3.)

The light-transmitting efficiency of a Tv-projector shutter is not an important factor, however, for the projected picture is very small, and the

camera pickup tube is sufficiently sensitive to give good results when a 500- or 1000-watt incandescent lamp is used as the illuminant.

Short Cut for Synchronizing

At this point it is worthwhile to consider once again the matter of intermittent film-pulldown in the Tv film-reproducing system. As we saw, the shutter is timed to produce a 1/1200-second exposure of the projected picture upon the mosaic 60 times every second. An eccentric movement which provides the 2-3-2 frame-timing sequence is desirable, but a regular movement having a pull-down ratio of 5:1 or faster gives equally good results. It is only necessary to make sure that the film is perfectly motionless during the brief periods of exposure.

The fact that ordinary 5:1-intermittent projectors can be used for Tv film pickup possesses considerable practical significance to the owners of small Tv stations unable to afford the high-priced projectors designed especially for Tv use. It happens that the claw-type intermittent movements of most 16-mm. soundfilm projectors have the 5:1 pulldown ratio. These machines may often be purchased second-hand for a hundred dollars or so and refitted with synchronous driving motors and suitably phased shutters.

Since the projector mechanism must be locked in proper time relation with the vertical synchronizing pulses fed to the camera pickup tube, a special synchronous driving motor with adjustable phasing is necessary. The regular projector shutter is removed, and the new Tv shutter, which is best made of heavy sheet metal, is attached to an extension of the motor shaft. The shutter may thus have a large diameter and be placed in front of the projection lens. Backlash must be absent from any gearing required, as timing of the Tv shutter is extremely critical.

For the very best pictorial results, an additional film aperture with a steady light-source and photoelectric cell is included within the projector to obtain a voltage control that varies with the average density of the film and, accordingly, average brightness. Without such a control, the characteristics of the camera tube may result in the blurring of dark scenes with a spurious fog.

Manual voltage control is often used, but it demands of the operator unceasing attention to picture quality and extreme promptness in applying corrections. The "engineers" of the smaller Tv studios are often untrained boys who have neither critical judgment nor the sustained interest in pictorial quality possessed by professional theatre projectionists.

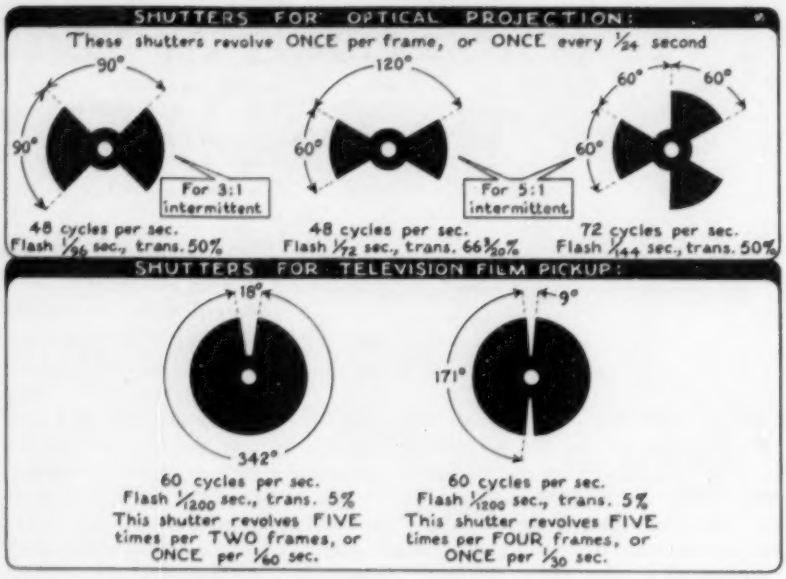


FIG. 3. A comparison of shutters for "optical" and Tv projectors. Of the two shutters having 60-degree blades, the 2-blade shutter transmits more light than the ordinary shutter for 3:1 intermittents, while the 3-blade shutter is intended for flickerless projection at the highest light levels. The two Tv-projector shutters shown function alike, the difference being their speed of rotation. Either one may be used on any Tv projector.

The "Multiplexer" System

Usually, two projectors are set up to "shoot" into an optical "multiplexer" which directs the beams upon a single camera tube by means of diagonal mirrors. The multiplexer also provides for a slide projector, thus permitting three projectors to be focused upon the mosaic of one pick-up tube.

A very satisfactory type of Tv film-reproduction system *which is not a projector* is the "flying-spot" film scanner. Instead of light passing out through the lens of the machine, as is the case with a projector, the flying-spot scanner functions like a camera. a special external source of light being focused *upon the film* by the objective lens.

The external light-source for this device is a small cathode-ray tube similar in structure to a Tv-receiver picture tube. The main difference lies in the phosphors with which the face of the tube is coated. The phosphors used for ordinary picture tubes keep on glowing for a fraction of a second *after* the electron beam has moved on to other parts of the phosphorescent surface, reducing the effect of flicker and giving a better illusion of smooth motion in the picture.

The flying-spot cathode-ray tube, on the other hand, makes use of phosphors having an extremely rapid glow-decay. No matter how rapidly it is moved, the electron beam produces only a bright dot of light on the face of this tube. There is no "streaking effect" due to "glow persistence."

Flying Spot Scanner

The face of the flying-spot cathode-ray tube is focused upon the film by the objective lens. Now, when a uniformly bright interlaced scanning pattern is impressed upon the face of this tube, a highly luminous spot of light rapidly scans the picture on the film running through the machine. The light passing through the film is modulated by the various densities of the photographic image much in the same way as a sound-track modulates a scanning beam. The modulated light is picked up by a photocell placed behind the aperture; and the fluctuating current produced by the photocell constitutes the video signal.

Neither intermittent nor shutter is used in the flying-spot film pickup be-

cause the film-photographs are scanned directly during the actual scanning periods, not during the blanked-out vertical-retrace periods. The film accordingly moves past the lens with continuous, smooth motion; and the scanning pattern on the face of the cathode-ray tube is electrically altered to compensate for the motion of the film.

Most Favored Method

Since the response of the photocell is directly proportional to the amount of light falling upon its cathode, and because the flying spot on the face of the cathode-ray tube can be made very small, the flying-spot film scanner gives images of a quality far superior to that afforded by conventional Tv film machines which project pictures upon the mosaic screens of "storage-type" camera tubes.

So far as actual engineering experience is concerned, some difficulty has been encountered in providing an absolutely smooth transport of the film through the flying-spot film-pickup apparatus. Also very critical are such factors as vertical "size" and linearity of the cathode-ray tube scanning. Intelligent design of the apparatus has eliminated these troubles in practical operation; and it is safe to say that most television technologists now favor this method of film reproduction above the projection method.

As explained before, the projector-type Tv film-reproducing system depends for its success upon the storage properties of the camera tube. The picture is flashed upon the mosaic only during the vertical-retrace blanking periods to produce a latent image of electrical charges. Subsequent scanning of the latent image by a sharply focused beam of electrons removes the charges in progressive fashion to provide the video signal.

Most pickup tubes of the storage type have several undesirable characteristics as regards reproduction of the photographic densities comprising the original picture. The tendency to fog low-key scenes has been mentioned. Another defect is "shading," a spurious signal generated by electrical processes taking place in the tube, and which produces bright misty areas at the top or bottom, or at the sides of the picture. Shading can be counteracted electrically to some extent, but flying-spot film reproduction is free from defects of this kind.

Even though the adjustment of Tv-projector shutters is more critical than that of ordinary projectors, small errors causing serious image deterioration, it should not be supposed that the optical-projection process can tolerate large shutter-timing errors. The theatre projectionist, like the Tv engineer, should check the condition and adjustment of the shutter at frequent intervals.

Errors in Shutter Setting

There are four distinct errors in shutter adjustment, namely, errors of (1) timing, (2) blade-and-opening angles, (3) phasing, and (4) rotation. The brighter the picture, the more damaging become the effects of these errors.

1. Timing Errors. Assuming that the shutter blades are of the proper width, the action of the shutter may lag or lead with respect to the functioning of the intermittent movement. Most modern theatre projectors have a shutter-setting knob to facilitate adjustment of the shutter timing during the projection of pictures.

If the shutter lags, failing to cut off the light when the film begins to move in the gate, travel ghost will appear as flickering streaks radiating upward from the tops of bright objects in the projected picture.

If, on the other hand, the shutter leads, allowing the light to pass before the film has come to rest, travel ghost will radiate downward from the undersides of bright objects in the picture.

In cases where the shutter is very far out of adjustment, it may be necessary to loosen the screws holding it to its shaft and bring it around near to

(Continued on page 32)

Simplex *f*:1.7 Light Shield and Water-Cooled Trap

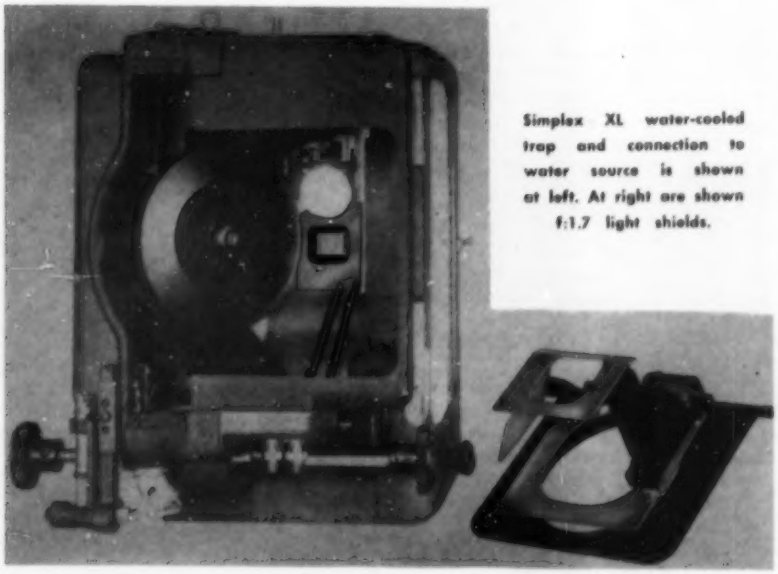
The Simplex XL projector mechanism is now available with special *f*:1.7 light shields and a water-cooled trap and aperture, National Theatre Supply announces. XL mechanisms now in use can be easily modified for *f*:1.7 use by means of adapter kits that are also ready.

The purpose of the *f*:1.7 light-shield design is to pass without any obstruction the beam of the new and faster high-intensity arc lamps now on the market. The National Excelite 135 with 18-inch reflector is an example.

The problem of increased heat at the film gate, making it difficult to thread or change apertures, is solved by the newly-designed water-cooled trap and aperture. This device makes it possible for the projectionist to work on a machine immediately after changeover.

Simplex XL mechanisms now in use can be easily modified in the field for *f*:1.7 operation. An *f*:1.7 modification kit containing the new light shields and a kit containing the new water-cooled trap are available through any National Theatre Supply office.

The standard Simplex XL mechanism will continue to be available for those theatres equipped with arc lamps that have light speeds of less than *f*:1.7 and operate at low amperages.



Simplex XL water-cooled trap and connection to water source is shown at left. At right are shown f:1.7 light shields.

In The

SPOTLIGHT

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

RECENT Department of Labor statistics show that fewer people applied for unemployment insurance benefits during the week of August 20 last than in any week during the past two years. The national total of those drawing benefits dropped to 971,000, the first time the figure dropped to below a million since November 1953.

On the surface this figure is encouraging. It indicates general prosperity. However, workers in the motion picture exhibition field, such as members of the projectionist craft, may wonder what all this prosperity means to them. From their point of view, things don't look so rosy. Theatres are still closing and salary increases are hard to get.

The fact is that projectionists are in somewhat the same boat as the workers in the textile mill towns of New England, and in the hard coal areas of Pennsylvania. Since the end of World War II there has been a chronic high level of unemployment in these areas despite the prosperity of the country in general. Oil and gas heat for homes permanently injured the hard coal industry, and competition from cheap labor in unorganized areas cost many highly-skilled New England mill workers their jobs.

Although not regional in character, the motion picture exhibition industry has been in somewhat the same position as the coal and textile industries. It has not grown apace with other industries during the last 10 years, and is not enjoying the full benefits of the present prosperous era. Picture houses are going to be around for a long time but they are not likely to ever again achieve the position they once held as the dominant and unchallenged mode of popular entertainment. This honor will have to be shared to some extent with home Tv.

This leaves the projectionist craft facing as difficult a situation as it has ever come up against. Real and crocodile tears are even now being shed by exhibitors who sieze upon every opportunity to cut the manpower in projection rooms and to reduce salaries of projectionists. Now is the time when union solidarity is most important if the gains of the past years are to be maintained. Additional benefits will not come easily.

● The IA won another jurisdictional battle with NABET when the film editors at NBC-TV, Hollywood, Calif., voted unanimously in a recent NLRB election to affiliate with IA Film Editors Local 776. John W. Lehners, business representative for Local 776, stated that similar challenges of NABET jurisdiction will be made by IA film editors in Chicago and New York.

● *Recent out-of-town visitors to IP:* Horace Evans and Rudolph Peterson, from Local 219, Minneapolis, and A. Milligan and A. L. (Pat) Travers, Toronto Local 173, called at IP offices during the past month. We enjoy these visits with our out-of-town friends, and we always find it interesting, to say the least, to get their viewpoints on matters of general craft interest.

● The immediate need for more education for projectionists was the theme of the fall meeting of the New York State Association of Motion Picture Projectionists held October 3 at the American Legion Hall in Syracuse, N. Y. Discussion from the floor during both afternoon and evening sessions of this gathering of veteran projectionists pointed to the need for education in the following three phases of the projectionists' work:

1. Projectionists need practical information about getting the best screen results from the powerful arclamps and fast optics needed for such new processes as CinemaScope.

2. Projectionists should prepare themselves to take a more active part in theatre-Tv and closed-circuit Tv hookups, particularly those that occur outside the theatre in auditoriums and hotels.

3. An active interest should be taken by projectionists in the technique of using portable 16-mm projection equipment. It was pointed out that although this equipment is relatively simple compared with the 35-mm machines used in theatres, many projectionists seem wary of accepting extra 16-mm work because they have not taken the small amount of time required to become familiar with these projectors. It was also remarked that a considerable change will occur before long in the 16-mm field when the Zenon-type of cold light source comes into wider use.

The meeting was presided over by George F. Kaaflaub, president of the Association, and Charles Wheeler, secretary-treasurer. Sitting beside them during the active and interesting forum on projection problems, were Jim Brennan, first IA vice president, and H. Paul Shay, of Local 289, Elmira, secretary-

NEW YORK STATE ASSOCIATION MEET HELD IN SYRACUSE

Opening session of the Association's annual Fall meeting which was held at the American Legion Club in Syracuse on October 3. Pictured above, left to right, are: Walter Scarfo, Syracuse L. 376; Louis B. Goler, Rochester L. 253; Charles F. Wheeler, Geneva L. 108 and secretary-treasurer of the Ass'n; George F. Raaflaub, Syracuse L. 376 and Ass'n president; James J. Brennan, IA first vice-president; H. Paul Shay, Elmira L. 289 and 10th District secretary-treasurer; Edward J. Dougherty, past president of the 25-30 Club of New York City, and John B. Smith, Syracuse L. 376.

treasurer of District No. 10. (N. Y. State).

The most vexing problem brought up at the forum was the situation of the projectionist called in to operate closed-circuit Tv equipment in hotels and auditoriums. The service engineers set up the equipment and often perform all the functions of operating.

Jim Brennan pointed out that this situation was far from the intent of the IA or President Walsh. He urged projectionists to insist on playing a proper role in all such showings. Other delegates to the meeting urged that projectionists prepare themselves thoroughly for this active role by learning all they can about operating closed-circuit Tv equipment.

At a recent closed-circuit hook-up between groups of psychiatrists with outlets in 40 cities, it was noted, only one projectionist out of 40 actually operated a complete show although 40 participated in the job under the terms of an agreement with the company that set up the closed network. Brennan emphasized again that the function of the service engineer is only to set up the equipment and instruct the projectionist. Such a division of work was actually essential, it was agreed, for the proper handling of all the details of putting on such a show.

The old problem of keeping CinemaScope magnetic tracks from coming into contact with stray magnetic fields within the projection room was also discussed. The need for non-magnetic aluminum sheeting to cover rewind tables was pointed out. It was noted by Irving Merkur, member of New York Local 306 and manufacturer of the Ace cue-marker and Ace splicing machine, that even such a tiny substance as metallic dust in the air can be ground against tracks as it goes through the machine and creates noise through the loudspeakers. The film, he stated, should be cleaned during rewinding with a velveteen pad to catch this dust.

Visitors and delegates to the Association meeting, who attended both the forum and the banquet sponsored by Syracuse Local 376, make up a list that includes many of the best known projectionists in New York State. A number of representatives of projection equipment manufacturers at the meeting included Arthur Meyer, International Projector Corp.; C. A. Lovgren, National Carbon Co.; and Roy Fisher, Fisher Mfg. Co.

The Association's Spring meeting was scheduled to be held in Binghamton, N. Y., May 8 next.

● For photography enthusiasts: The Berks Camera Club of Reading, Penna., is now accepting entries for its forthcoming 8th International Color Slide Exhibition. The closing date for all entries is April 21, 1956. For further information contact John H. Kline, exhibition chairman, 312 Raymond St., Hyde Villa, Reading.

● An agreement was reached between Local 691, Bluefield, W. Va., and the management of the Center Theatre there. Ownership of the theatre recently changed hands and the new owner discharged the IA projectionists working there. After a month's intensive picketing the new owner agreed to rehire the IA men and signed a contract calling for an increase in wages.

● James A. Whitebone, secretary and business manager for Local 440, St. John, N. B., was re-elected president of the New Brunswick Federation of Labor for the 25th consecutive term.

● September 7, 1955 is a date Miss Florence Rose, office manager for Local 165, Hollywood, Calif., will long remember for it was on that day that she was doubly honored by her co-workers. On that day the members of the Local presented Miss Rose with an engraved gold wrist watch to which was attached a $100 bill. Richard Frisbie, president of Local 165, made the presentation on behalf of the membership as a token of appreciation of her "faithful, efficient, and untiring efforts in fulfilling the many duties during the five years of service rendered to the Local, its officers, and its members."

With the cooperation of the officers of the Local, a second presentation was made to Miss Rose when Dave Narcey, acting on behalf of the 25-30 Club of New York, awarded her a gold honorary life membership card, thus making her the second woman to hold honorary life membership in the Club. Miss Rose, or "Rosie," as she is affectionately known to her many friends throughout the Alliance, worked in the IA general office in New York for 23 years prior to moving to the West Coast, serving under the leadership of IA Presidents William F. Canavan, William Elliott, George Brown, and Richard F. Walsh.

HOLLYWOOD LOCAL 165 OFFICE MANAGER HONORED

Dave Narcey, front row third from left, member of New York Local 306 and one of the founders of the nationally-known 25-30 Club of New York, is shown presenting Miss Florence Rose, office manager for Local 165, Hollywood, Calif., with an Honorary Life Membership card in the Club together with a beautifully engraved scroll. Pictured above are Local 165 members who participated in the ceremonies. Front row, left to right: Pat Offer, member of the executive board; Miss Rose; Narcey; and board members Leo Guinan and Ed Werling. Standing, rear, left to right: Harold Masser, board member; Richard Frisbie, president of the Local; Don Kloepfel, board member; Allen Pullene, secretary-treasurer; Ed Higgins, business representative; board members Hugo Hawley and Dwight Moore.

● A. L. Cash, business representative of Local 646, Ft. Lauderdale, Fla., for the past 25 years, was recently elected president of the Brownard County Central Labor Union. Cash organized the Local back in 1923 and has served in an official capacity since that time.

● Eddie Stewart, member of New York Local 306, was reappointed to the New York State Workmen's Compensation Board.

● The H. Paul Shays of Local 289, Elmira, N. Y., celebrated their 30th wedding anniversary on September 29. Our very best wishes for many more anniversary celebrations.

Another Anamorphic Process

Don't get frightened, but another Hollywood studio has come up with a new wide-screen anamorphic process. The studio is Republic, and the process is known as Cinepanoramic. The studio stated that Cinepanoramic prints could be shown with all presently-installed anamorphic projection equipment.

Count Them! 15 Different 35-mm Release Prints

Continuing experiment and innovation are necessary to the health and prosperity of the motion picture industry, but confusion can strangle progress and defeat the purpose of long-needed changes.

DO YOU have any idea how many different types of release print are now in distribution or supposedly scheduled for distribution to theatres shortly? Well the number is *fifteen*, and that includes only 35-mm prints. Horizontal, or 55- or 70-mm or other off-size prints for roadshow presentations are not included in the above tabulation. The 15 types include only 35-mm release prints presumably intended for general distribution.

In case anyone doubts that 15 different varieties of print exist, he can take a look at the accompanying table prepared by the Motion Picture Research Council of Hollywood, Calif. It is true, of course, that some of these prints differ from others only slightly, but the differences exist and a variety of sound equipment, lenses, apertures, etc., are required to project them.

In an attempt to reduce the confusion resulting from this wide difference of opinion among the studios as to what the characteristics of a release print should be, the Research Council has classified these various types of print and recommended identification practices to exchanges so that a print can be instantly recognized by projectionists.

The recommended identification practices include labeling the reel bands of each type of print so that a projectionist can tell whether a print is anamorphic or non-anamorphic, whether it is a non-squeezed print designed for wide-screen, and, if so, in what aspect ratios it may safely be projected.

Also included will be information as to the degree of squeeze used in making anamorphic prints. At present, all available anamorphic prints have the 2 to 1 anamorphic squeeze ratio used for CinemaScope, but Paramount announced some time ago that it would make available VistaVision anamorphic prints with a squeeze ratio of 1.5 to 1.

The labels will further contain a description of the sound track or tracks on the film, noting whether they are magnetic or optical, and, if optical, whether they contain sound cues for the Perspecta stereosound system.

RELEASE PRINT ASPECT RATIOS AND EQUIPMENT REQUIREMENTS

Process	Anamor. Ratio	Max. Aper. Dimensions[1]	Aper. Aspect Ratio	Max. Screen Aspect Ratio[1]	Type of Sound	Integrator Pre-Amp.	Pre-Amp.	Main Amplifier	Stage Speakers
CinemaScope	2:1	0.912 x 0.715	1.275 to 1	2.55 to 1	4 tr. mag.[4,5]	No	4	4	3
CinemaScope	2:1	0.912 x 0.715	1.275 to 1	2.55 to 1	1 tr. mag.[4]	No	1	1	1
CinemaScope	2:1	0.839 x 0.715	1.175 to 1	2.35 to 1	Optical	No	1	1	1
CinemaScope	2:1	0.839 x 0.715	1.175 to 1	2.35 to 1	Opt.direct.[6]	Yes	3	3	3
CinePanoramic	2:1	0.912 x 0.715	1.275 to 1	2.55 to 1	4 tr. mag.[4,5]	No	4	4	3
CinePanoramic	2:1	0.839 x 0.715	1.175 to 1	2.35 to 1	Optical	No	1	1	1
SuperScope	2:1	0.715 x 0.715	1 to 1	2 to 1	Optical	No	1	1	1
SuperScope	2:1	0.715 x 0.715	1 to 1	2 to 1	Opt.direct.[6]	Yes	3	3	3
VistaVision	1.5:1	0.825 x 0.740	1.115 to 1	NOTE 3	Optical	No	1	1	1
VistaVision	1.5:1	0.825 x 0.740	1.115 to 1	NOTE 3	Opt.direct.[6]	Yes	3	3	3
VistaVision	none	0.825 x B[2]	NOTE 3	NOTE 3	Optical	No	1	1	1
VistaVision	none	0.825 x B[2]	NOTE 3	NOTE 3	Opt.direct.[6]	Yes	3	3	3
3-D double	none	0.825 x B[2]	NOTE 3	NOTE 3	Optical	No	1	1	1
Wide screen	none	0.825 x B[2]	NOTE 3	NOTE 3	Optical	No	1	1	1
Wide screen	none	0.825 x B[2]	NOTE 3	NOTE 3	Opt.direct.[6]	Yes	3	3	3

[1] **NOTE 1:** Aperture dimensions and screen aspect ratio are specified at 0° projection angle.

[2] **NOTE 2:** B will be 0.600" at 1.375 to 1 aspect ratio. Other aspect ratios will require the following dimension for B:

1.66 to 1	B = 0.497"	1.85 to 1	B = 0.446"
1.75 to 1	B = 0.472"	2.00 to 1	B = 0.412"

[3] **NOTE 3:** On these prints the maximum and minimum aspect ratio in which the picture can be shown is given. The minimum aspect ratio defines the projector aperture ratio below which the frame lines will show. The maximum aspect ratio defines the projector aperture ratio above which significant action will be lost.

[4] **NOTE 4:** These types of release prints require a magnetic sound head and sprockets for CS narrow perforations. All other types use an optical sound head and sprockets for standard perforations.

[5] **NOTE 5:** This type of release print requires surround speakers.

[6] **NOTE 6:** Perspect-A-Sound is now the only type of directional sound available.

More on C'Scope Trailers

To the Editor of IP:

I noted with interest the article about CinemaScope trailers on page 16 of the May issue of IP. They are my only worry in this new setup.

I figured out a simple way for projectionists not having retainer rings to mark the position of the lens when changing from widescreen to CinemaScope. (We have standard Simplex heads, variable anamorphics, and 4½-inch E.F. widescreen lenses.) Here is what I marked my widescreen lenses and CinemaScope "back-up" lenses with:

After focusing by hand, I placed a strip of white half-inch adhesive tape around the barrel, marking the tape at the front edge of the projector case or head. Then when I put the lens in, I slip it to that mark; and the picture nearly always comes on in focus. Simple? Projectionists who find the picture badly out of focus on changeovers might like to try this method.

I wish to know why so many projectionists run the volume so high with both magnetic and optical sound. I have heard numerous complaints about excessively loud sound.

In regard to the complaint appearing on page 26 of the May issue anent out-of-focus pictures, I wish to say that I have had no trouble obtaining a sharp CinemaScope picture. All I do is keep the lens clean and focus it carefully.

Our aspect ratio is 1.75/1 for widescreen and 2.33/1 for CinemaScope. I have been highly complimented on my good-looking screen — sharp and bright with sound volume more pleasing than that heard in many larger towns. We have a throw of 90 feet, a 12-foot by 23½-foot silver screen, and are using 45-amp. Motiograph arc-lamps and Simplex sound.

Technicolor's practice of mounting an 85-minute feature on six reels instead of five seems crazy to me. Also, there is too much variation in the volume of their sound-tracks.

ALBERT POWERS

Ashland, Kansas

EDITOR'S REPLY: It is always a good idea to position-mark the barrels of all the different lenses which are interchanged during projection. Nevertheless, some form of mechanical stop, such as retainer rings, is preferable for minimizing incorrect focus when changing over to a machine in which the projectionist has inserted a different lens. Retainer rings save time and eyesight, and they automatically eliminate accidental errors in resetting the lens.

Adhesive tape is satisfactory only if the lens barrel never gets warm enough to soften the adhesive and allow the tape to creep — which is very likely to happen. Metal-marking lacquer of the type used by machinists is relatively permanent and, of course, immovable. Some projectionists prefer scoring the lens barrels by means of a sharp steel instrument. We do not approve of scoring because the scratches, once made, cannot be removed for correction at some later time.

Keep Watching Focus

Frequent "touching up" of the focus by hand is *absolutely essential* to sparkling clarity of the picture at all times. This is especially true when lenses of shorter E. F. than 4 inches are used. Even lenses in the 4- to 6-inch range show up the effects of focus-drift sufficiently to demand constant attention on the part of the projectionist. Slightly different settings are also required when changing from black-and-white to color, or from nitrate film to safety film.

Theatre patrons are more annoyed by blurriness of the screen image than by any other projection defect. Like other skilled projectionists, Mr. Powers considers his audiences and devotes constant attention to lens focus. The few "operators" who seldom touch the focusing knob have given the entire craft a bad name.

Projectionist complaints of poor focus are aimed at the photographic quality of the prints, both regular and CinemaScope. Any film can be focused sharply on the screen, but if the picture on the film is out of focus, the projected picture will also be out of focus. In such cases any scratches present in the emulsion will look clear while the picture, itself, looks blurry. Far too many release prints have slightly "fuzzy" image definition — just blurry enough to interfere with the enjoyment of patrons seated in the first 15 or 20 rows.

Mr. Powers' dissatisfaction with short feature-film reels is justified. (Remember when *all* features were shipped on "single" reels?) An 85-minute feature comprises 7,650 feet of film. This is practically an 8-reel feature, and probably could have been mounted on 4 "double" reels, each holding close to 2,000 feet of film.

Reel divisions are made on fades whenever possible; and, of course, a cut in the middle of a camera shot is inadmissible. But single camera shots are rarely longer than 200 feet of film, and most of them are only from 10 to 75 feet long.

Overloaded Reels

Reels should never be overloaded, for film damage may result if the outer turns should accidentally slip off and unwind. That is why most exchanges prefer to wind slightly *less* than 2,000 feet of film on a double reel. But even if 18 minutes of playing time (1,620 feet) is the preferred length for a double reel, an 85-minute feature could easily have been divided up among 5 reels, each averaging only 1,530 feet (17 minutes).

Optical soundtracks on Technicolor prints are ordinary silver images printed and developed *before* the colored pictures are applied to the blank frame areas. The troublesome volume variations can therefore be traced to the sound negatives, the preparation of which Technicolor ordinarily has nothing to do. The same variations would have appeared in a black-and-white print.

Another Blow at Mr. Connor

To the Editor of IP:

Methinks Mr. Edward Connor "don't know from nothin!" Your answer to his letter published in the August issue of IP should necessitate his sending in a retraction. However, I think you overlooked another flaw in his would-be argument. You could have called his attention to the fact that he apparently knows nothing about Tv sets either, or he would know that a Tv owner has no control over the focus of the picture. This can be performed only at the transmitter on the sharpness of the horizontal scanning lines.

L. C. RODERICK, Local 150

Alhambra, Calif.

EDITOR'S COMMENT: In our anger at Mr. Connor's irresponsible accusations, we overlooked this further example of what seems to be a complete disregard for fact.

Fox Reports on 55-mm Plans

20th Century-Fox announces that there may be special roadshow performances of its forthcoming film, "The King and I," using 55-mm CinemaScope prints and special projectors. There is no definite information available as yet on how much emphasis Fox will place on 55-mm CinemaScope prints, but it is believed certain that most CinemaScope photography will soon be done on 55-mm negatives. These large negatives would be reduced during printing to 35-mm size.

Report from SMPTE Convention

A NUMBER of improvements in theatre projection and sound equipment were reported in technical papers read at the semi-annual convention of the Society of Motion Picture and Television Engineers, held early this month at Lake Placid. Brief synopses follow of some of the papers which are of particular interest to the projection craft:

Polyester Photographic Film Base

D. R. WHITE, C. J. GASS AND E. MESCHTER
E. I. du Pont de Nemours & Co., Inc.

Properties of "Cronar" polyester photographic film base are outlined. The utility and importance of these characteristics in the use of photographic films, especially motion picture films, are discussed. Optical clarity, high wear and tear resistance, low moisture sensitivity and relatively high stiffness modulus combine to make this base an excellent one for general use, and particularly useful in certain demanding situations.

Todd-AO Motion Picture System

BRIAN O'BRIEN
American Optical Co.

The Todd-AO System utilizes either 65- or 70-mm film of identical perforation operating at 30 frames/sec. Cameras weigh only slightly more than corresponding 35-mm units, and are equipped with a complement of lenses of angular coverage ranging from 16° to 132°, with relative aperture ranging from *f*/2.8 to *f*/2.0. Picture aspect ratio is approximately 2 to 1, and projection is upon a large deeply curved screen with sagitta *(depth of curve)* approximately ¼ the chord *(straight line that touches left and right edges of curved screen)*.

The screen is illuminated by a single projector located in the rear of the theater, and of relatively conventional design with certain special features and special projection lenses to achieve very high quality images from the large film. Composite sound is provided by six high quality magnetic channels.

New Concepts of Perspecta Sound and Projection Control Practice

R. A. HAINES
Army and Air Force Motion Picture Service

Development concepts and assembly details are described for new custom-designed perspecta integrators and projection control devices being employed throughout the largest overseas American military theater circuit serving in the Far East.

Featuring capability of full-time employment of 3-channel directional sound reproduction in operation from any photographic film-track or other signal source, the integrators combine provisions for simplified operation, complete emergency switching to prevent sound failure, and extreme service accessibility. The new semi-automatic dual push-button controller is an original, unique idea which achieves maximum centralization of all operational controls. More than one hundred sets of these equipments are being installed in Far East Army and Air Force Theaters.

Perception of Color in Projected and Televised Pictures

D. L. MAC ADAM
Eastman Kodak Co.

Many color photographs are taken in daylight and projected with tungsten lamps. On the other hand, commercial motion pictures made with tungsten studio lamps are almost always projected with arcs that resemble daylight.

Color television receivers produce "white" of daylight quality or even bluer, although most of the scenes televised are tungsten-lighted. Hence the question: "How should a color in one quality of illumination be reproduced for viewing with some other quality?" An investigation undertaken to answer this question will be described, and the results will be discussed.

Analysis of the behavior of the eye seems to indicate that human color vision is served by at least four and probably by five or even six different photosensitive processes, having different spectral sensitivities and different degrees of adaptation to various qualities of illumination.

These findings do not call into question the trichromatic character of color perception, on which color photography and color television are based. Apparently the visual nervous system provides only three channels, capable of handling only three independent responses. But each of these responses appears to be stimulated by a combination of two or more photosensitive processes in the eye.

Optical Multiplexing in Television Film Equipment

A. H. LIND AND B. F. MELCHIONNI
Radio Corporation of America

The primary reason for multiplexing Tv film cameras and Tv film projectors is economy of equipment and/or space. A further reason can be the insurance of standby protection, at a nominal cost, when continuity of programming assumes a high order of importance.

TESMA Forum Will Take On All Technical Questions

Discussions of the new 20th Century-Fox 55-mm film and projection process and the final form of the Todd-AO system will be features of the equipment forum to be held as part of the TESMA Convention and trade show or projection equipment at the Morrison Hotel, Chicago, from November 6 to 9. In addition, the forum panel will answer questions on projection equipment in general that are presented from the floor.

Invitations to lead the discussions of their respective processes have been extended to L. D. Nétter, Jr., for Todd-AO, and to Earl J. Sponable, 20th Century-Fox technical director. The forum will be moderated by TESMA vice president L. W. Davee, of the Century Projector Corp., an acknowledged expert on the projection of the big film frame and one of the developers of the old 70-mm Grandeur projection method. His company is the manufacturer of the projectors for Cinerama and Paramount's double-frame horizontal projectors.

Plans are to solicit in advance of the forum the "most asked" questions of projectionists and exhibitors so that forum experts will be able to start the ball rolling by commenting on immediate technical problems.

The panel members will not be asked to prepare or to read papers on the various phases of theatre equipment in which they are experts. They will devote their time to informal comment and to answering questions. Only two papers, one on the Fox 55-mm process and the other on Todd-AO, will be read. Questions on these processes will be answered by Sponable and Netter or their designated representatives.

The equipment forum has been set for the afternoon of Wednesday, November 9, so that theatre men who have attended the show on any previous day may get answers to questions that came up when they examined the equipment on the trade show floor.

In addition to those mentioned above, other members of TESMA invited to be members of the panel and answer questions from the floor are: Fred Aufhauser, Projection Optics Co.; Al Boudouris, EPRAD Corp.; J. A. Fetherston, Kollmorgen Optical Co.; Arthur Hatch, Strong Electric Corp.; Francis Keilhack, Drive-In Theatre Mfg. Co.; Fred C. Matthews, Motiograph, Inc.; Arthur Meyer, International Projector Corp.; V. J. Nolan, National Carbon Co.; J. F. O'Brien, RCA, and Leonard Satz of Raytone Screen Co.

PERSONAL NOTES

JOHN L. BRADLEY has been appointed assistant advertising and sales promotion manager by the Ampex Corp., Redwood City, Calif., manufacturer of theatre sound systems and other electronic equipment. A graduate of Stevens Institute of Technology, he was formerly associated with Magnatran, Inc., Kearney, N. J., producer of transformers.

• • •

DR. CLARENCE E. LARSON was named vice president in charge of research by the National Carbon Co. He was formerly director of the Oak Ridge National

Dr. Clarence F. Larson

Laboratory, operated for the Atomic Energy Commission by Union Carbide and Carbon, parent company of National Carbon.

Dr. Larson will head all National Carbon research activities including research in new physics and will be a member of Union Carbide's research committee. His headquarters will be in Cleveland, Ohio, at the company's new research laboratory now under construction. A graduate of the University of Minnesota, he received his Ph.D. from the University of California.

DR. L. M. CURRIE, formerly vice president in charge of research, has been advanced to a new post involving production, development and research.

• • •

DR. WILLIAM H. VINTON, a chief supervisor at Du Pont's Photo Products Department plant in Parlin, N. J., has been named product manager in charge of new product development in Wilmington, Del. Dr. Vinton joined Du Pont as a research chemist in 1943. He transferred to Photo Products in 1947 as a research group leader at the Parlin labs.

Census of Movie Business

The most comprehensive census of the motion picture business ever made will be released by the Federal Census Bureau at the end of the year. Millions of statistics have been collected on wages, dividends, cost and incomes for every phase of the business from production to exhibition and even popcorn concessions.

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NEW YORK OFFICE: 30 CHURCH STREET, NEW YORK 7, N. Y.

The Future of Magnetic Sound

The battle lines are still drawn and there is no sign of a truce flag anywhere. In July, IP printed some comment by Lorin D. Grignon, 20th Century-Fox development engineer, on the efficiency and endurance of magnetic sound tracks. We then added a few words of our own in rebuttal. In the following letter, Mr. Grignon rightfully questions one of our points. We continue to take issue.

Dear Sir:

I notice that you published my recent letter to you in the July issue of IP. You added a considerable amount of comment and, again, I find much of it in error.

All producers of CinemaScope magnetic release film make these prints by a direct rerecording process and not, as you state, by passage at high speed through a high-frequency magnetic field. Very little loss of sound quality results by the method of printing used.

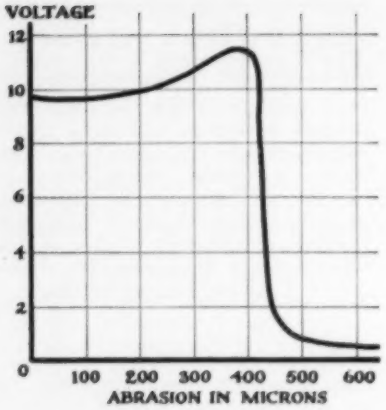
On page 17 is reproduced a graph which by implication explains to your apparent satisfaction, loss of 8,000 cycle response of CinemaScope magnetic tracks as a result of abrasion. The caption associated with the figure is not entirely clear. If, for example, the graph applies to wear of the magnetic tracks, then it is grossly in error, since the magnetic material on the release film is only 15 to 16 microns in thickness.

Our experience is that the release film is so badly mutilated by tears and breaks before the magnetic tracks are significantly worn that there is little need to be concerned about the life span of the magnetic material under prevailing conditions.

On the other hand, if the figure applies to magnetic reproducing head wear, then the data is still subject to question because our experience differs by a factor of 10 to 1; we have tested many heads and all are better than the data given in the figure.

It is meaningless to give data of this kind without full specifications of the head which was used for the test because the results will depend upon the cross section dimensions of the core material, the kind of material, the film tension, and the uniformity of the gap dimensions as wear progresses. If a head is well constructed, properly designed, and uses appropriate materials, we know from actual theatre use that such a head will outwear some projection machine parts. Optical soundhead equipment demands periodic replacement of such devices as exciter lamps, photo cells, rectifiers and rollers, and it certainly seems reasonable that the theatre can periodically replace magnetic heads approximately once a year.

LORIN D. GRIGNON
Development Engineer
20th Century-Fox



The above chart shows how the output of a magnetic reproducing head changes through wear. The voltage values on the left show the changes in output voltage as wear increases and a test loop is run through the reproducer. Various degrees of abrasion are indicated in microns at bottom. As thousands of feet of film abrade the pole pieces, gradually wearing them down, the magnetic head at first becomes slightly more sensitive, raising output voltage by a volt, and then abrasion quickly renders the device unfit for further use. When 500 microns (about 0.0197 inch) have been rubbed off the poles, the output of a 90%-modulated 8,000-cycle track drops from more than 11 down to less than 1 volt. Distortion of the sound sometimes accompanies the drop in output voltage. No time element is indicated in the graph because head wear varies greatly according to the material used.

Further IP Opinion on Sound

WE STAND to be corrected anent the statement that "Fox prints its magnetic tracks at high speed *via* passage of the master copy and the unmodulated print track through a high-frequency magnetic field . . ." As Mr. Grignon points out, direct re-recording is used for CinemaScope prints; and we are confident that the correctness of the latter part of our statement (". . . a method which does not give as good results as re-recording on the print tracks") is adequately indicative of the relatively high quality of the magnetic tracks on 20th Century-Fox CinemaScope prints.

Our error in this respect is attributable in part to an incorrect report emanating from the West Coast, and in part to a mistranslation occurring in the English-language edition of an article by one of the foremost sound technologists of Germany. The translation reads as follows:

"Under the effect of the alternating magnetic field, the adjustment of the magnetic particles is transferred from the 'mother' tape to the 'daughter' tape. On account of the high speed with which this method can be worked it is very economical *and therefore widely used.*"

The phrase "and therefore widely used" does not occur in the original article written in German.*

The graph mentioned by Mr. Grignon was issued by the manufacturing firm of Zeiss Ikon AG. of Stuttgart, and refers to abrasion of the *average* type of CinemaScope quadruple-track magnetic head by the friction of moving film rubbing against the pole pieces and gap foil. The character of the graph, we assumed, was sufficiently well indicated by the calibrations which run up to 600 microns. It could not be used to chart wear on a substance only 16 microns thick when new.

We find this graph representative of the response characteristics of the "average," or "normal," type of commercial CinemaScope head as wear progresses, and this irrespective of quality and life expectancy. By no manner of logical reasoning can this graph be interpreted as an adverse

*, , Unter dem Einfluss des magnetischen Wechselfeldes übertragt sich dann die Ausrichtung der magnetischen Partikel des ‚Mutterbandes' auf das ‚Tochterband.' Wegen der mit diesem Verfahren erzielbaren hohen Kopiergeschwindigkeiten ist das Verfahren besonders wirtschaftlich." (Aus , , Magnettontechnik" von Dr. Thiele in Bild und Ton, Nr. 34, Seite 11.)

reflection upon any make of magnetic reproducing head.

All of the factors mentioned by Mr. Grignon *with the exception of film tension* influence the shape of the curve; but we have not yet discovered any significant variation in the response characteristics among the various makes of heads in wide use. It should be obvious that profound manufacturing variances in, for instance, magnetic reluctance and gap width would make it electrically unfeasible to interchange the several makes of magnetic heads and preamplifiers, as can now be done with most commercial equipments.

Description Is Accurate

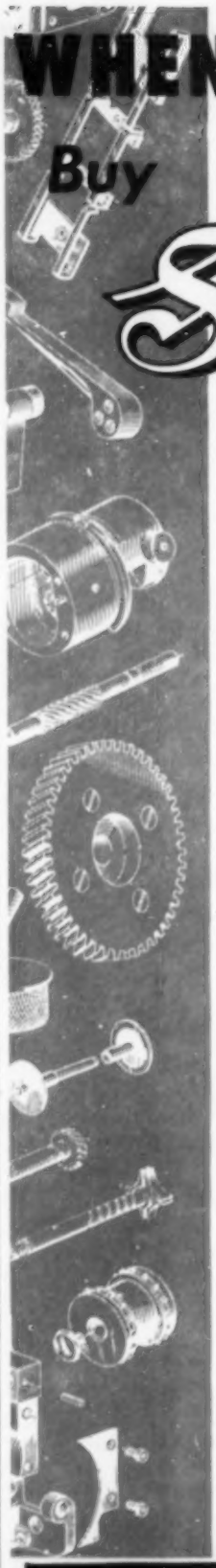
It must be pointed out that the caption for the graph is our own, not the original one.** We believe, however, that our caption reliably describes actual operating conditions with the possible exception of a few of the later heads which utilize radically different materials for prolonged life. In much less than a year, *with normal use*, a voltage-output drop following a slight progressive rise in response is experienced with the *average* CinemaScope head.

But perhaps our indicating head life by the dimension of time is too ambiguous—the number of feet of film which the head is able to reproduce satisfactorily is a better one. Here we find that the *average* head subjected to *average* film tension will reproduce approximately 3,000,000 feet of film before pronounced abrasion and accompanying drop in output renders the device unfit for further use. This represents from 6 to 8 months of service with 4 days of CinemaScope feature-film projection per week, 3 shows per day.

Some of the later heads made of longer-wearing materials will last for 4,000,000 to 6,000,000 feet of film—about 9 or 10 months of service at the minimum, 14 or 16 at the maximum. In many cases, however, the harder materials have undesirable magnetic properties and scratch the magnetic tracks. This is by no means true of all long-life heads; and the scratches inflicted upon the magnetic oxides of the tracks seldom introduce noise or distortion in the reproduced sound.

We cannot subscribe to the view

**, , Pegelabfall des Vierfachmagnetkopfes." "Slope of quadruple magnetic head."



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held by the proponents of magnetic soundtracks *for theatre release prints* that such tracks are either stable under the conditions of everyday theatre use or immune from magnetization changes which interfere with the quality of the sound. In spite of the small number of theatres equipped to play CinemaScope magnetic tracks, loss of signal strength (especially in the high-frequency end of the sound spectrum), volume variations from foot to foot and from track to track, and the pick-up of machine noises are fairly common phenomena.

The use of magnetic tracks *on release prints* also contributes to physical mutilation of the film—torn sprocket holes and scratches on the picture area being the most frequent complaints. Even though stereophonic sound reproduction may or may not be artistically desirable in motion pictures, the advocacy by Fox of magnetic tracks *on release prints* for single-channel reproduction is open to question. Optical sound is very well suited for monaural motion-picture sound, and, for that matter, is readily adaptable physically to pseudostereophonic and "2½"-channel stereophonic reproduction (Perspecta Sound and PhotoStereo Sound).

This writer knows of no projector-mechanism part which does not outlast any CinemaScope magnetic head on the market today. Even an intermittent sprocket subjected to the rapid-wearing effect of excessive film tension will last a couple of years if reversed to make use of both sides of the sprocket teeth.

The periodic replacement of such optical soundhead components as exciters and photocells involves no very great expense, and cannot reasonably be compared costwise to the replacement of magnetic reproducing heads. No optical soundhead has as many, or such expensive, rollers as a CinemaScope head, as the writer well knows by experience.

Theatres Expected to Hold Attendance Gains

Although motion picture attendance fell slightly during the second quarter of 1955, the increased number and wider use of drive-ins during the third quarter is expected to push attendance figures to a higher level later this year.

Attendance at drive-in motion picture theatres has now reached a point where it is as great during the peak summer months as the attendance at four-wall houses, despite the fact that the hardtops far outnumber the drive-ins.

Total attendance at all theatres for the year 1955 is expected to be about 50,000,000, according to Standard & Poors, the Wall Street statistical firm. The gross take at American theatres, less admission taxes, is expected to be about $1.3 billion, a slight gain over last year, but the major circuits are not expected to profit further by this increase in gross. Their profits will be about the same as last year, the financial firm predicted. Fewer theatres in operation, plus higher film rentals and other operating costs, will restrict profits, it was predicted.

Studios in Good Position

Summing up, Standard & Poor's finds:

"Increased production of feature motion pictures, coupled with this new television business, has stimulated activity at most film studios, permitting greater utilization of personnel and facilities.

"Film rental rates are averaging higher. Moreover, improved attendance abroad and less stringent currency restrictions will probably permit somewhat larger 1955 foreign revenues.

"Thus, earnings by motion picture producers are likely to run moderately higher on average, although results of individual companies may vary widely."

Pay-Tv Caught in Legal Snarl

The question of whether the exhibition industry is going to be faced with further competition from pay-as-you-see Tv is now snarled in a complicated legal muddle. Washington sources say that it is not likely that any decision will come before 1956, or any real action before 1960 if the decision favors the coin-box Tv interests.

A stack of bound volumes, which would stretch to a height of 22 feet contains the reply of motion picture exhibitors and others to the invitation of the Federal Communications Commission to speak out on objections to the pay-as-you-see Tv proposals. These replies fill 68 volumes, each four inches thick.

Expand Fleetwood Tv Sales

Distribution of the Fleetwood TV projector in the Southeastern states is now being handled by Hoover Enterprises, Inc., of Miami.

. . . Are Your Sprockets Showing? . . . They sure are if they're worn—and your patrons won't approve! To stop that very annoying film jump caused by worn parts, have your projectors overhauled using the finest parts throughout—LaVezzi, of course! Your Theatre Equipment Dealer has them.

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Ray Brian—Motion Picture Historian

WE present here the fourth installment of Ray Brian's fabulous collection of motion picture projection equipment and data, which he amassed over a period of many years of painstaking and intensive research.

A member of Local 434, Peoria, Illinois, Brian is constantly seeking to make new additions to his already extensive collection. With the exception of those listings marked here with an asterisk, he has photographs, and in many instances, physical possession of the equipment listed. IP readers having additional data are urged to contact Ray Brian through this publication.

Following is the listing for this month:

ECLIPSE—Gaumont British Co., London, England, 1928-1935.

EDISON—"Kinetoscopes", 1889-1914.

EDISONOGRAPH—Edison's spool-bank projector of 1896.

EDENGRAPH—Francis B. Cannock, 1899.

EDUCATIONAL— . . . .*

EDUCATOR—made in St. Louis, Mo., about 1920.*

EFFICIENCY— . . . .*

ELGE—French Gaumont Co., 1910.

ELECTRASCOPE—before 1900.*

EMPIRE—W. Butcher and Sons, London, England, 1911.

EIDOLOSCOPE—Latham's 2nd machine, 1895.

ERAGRAPH—Hayden and Urry, London, England, 1896.*

ERKOSCOPE— . . .*

ERNEMANN—Zeiss-Ikon, Germany, since 1910.

ERNON—made in Germany by Ernemann, 1934.

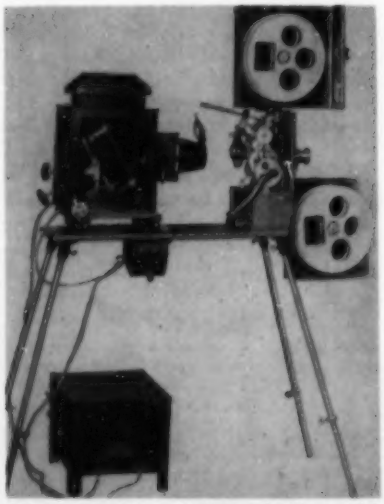
ERKO—made in Germany by Maschinenbau about 1928.

ERTEL—made in Germany, 1910.*

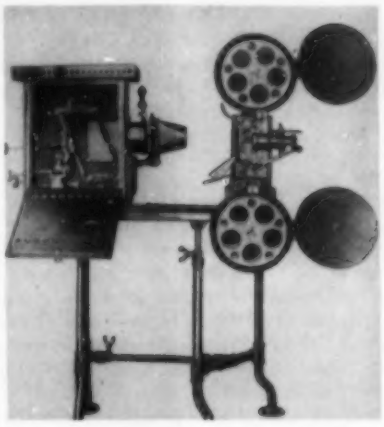
EUREKA—made by Webster and Kuhn, 1897.

EUREKA—made in France, 1899.*

EUREKA—made by Pio Pion, Milano, Italy, 1952.



Edison's "Kinetoscope"—1906 exhibition model.



1914 model of the Edengraph motion picture projector (forerunner of the Simplex).

EURO—made in Germany by A. E. G., about 1930.

EXCELLOGRAPH—Elias P. Dunn, 1898.

EXCELSIOR-BLOC—made by Laval, Paris, France, 1931.

EXCELSIOR—made by P. Malinverno, Milano, Italy, 1953.

F and H—made by Frieseke and Hoepfner, Germany, 1953.

PONOCINEX—made in Brazil.

FULCO—E. E. Fulton Co., Chicago, Ill., Ernemann #5 Mechanism.

[TO BE CONTINUED]

Atom Next Cinerama Subject

Peacetime uses of atomic energy will be the theme of a new Cinerama feature now in production. The film is being made with the technical assistance of the Atomic Energy Commission. It is expected by Cinerama, Inc., to attract an audience as high as 100 million after it is released some time in the second half of 1956.

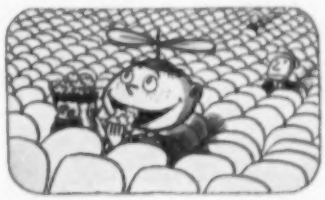
Production plans differ from previous Cinerama features in that a standard 35-mm negative will be photographed at the same time as the Cinerama triple negative. Standard prints will be released overseas, and probably in isolated areas of the United States.

German Union May Make Films

DGB, a West German labor organization has announced a plan to enter the motion picture production business by buying a 33% interest in the Ufa studios, the largest producing organization in the German film industry. Ufa is now owned by the Bonn government and will soon be sold.

The union announced further that it would work for lower film production costs for German films after it buys into Ufa, and that it will also start a campaign for lower admission prices at German theatres. German film producers are said to be considerably disturbed over the announcment.

Your popcorn may taste terrific . . .



Your seats may be softest . . .

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Nation's Theatres Increase Slightly (7 more)

A recent survey of the number of theatres operating nationwide at the midpoint of this year indicates that the exhibition industry is continuing to hold its own. An increase in the number of drive-ins more than offsets a decrease in active four-wall theatres. The result was a small net gain of seven theatres during the six-month period ending July 1.

According to a survey made for the Committee of Motion Picture Organizations, there were 14,724 active four-wall theatres and 4,384 drive-ins as of July 1, a total of 19,108. This is the largest number of theatres in operation since 1946, and represents a net gain of 1,644 from the low point reached in March, 1954, just prior to Federal tax relief.

At the end of 1954, there were 15,039 active four-wall theatres and 4,062 drive-ins, a total of 19,101, according to the tabulation which was prepared for COMPO by the Sindlinger research organization.

During the first half of this year, there were 900 closings of four-wall theatres, while 585 new and reopened theatres were activated. Thus, the net loss in four-wall houses was 315.

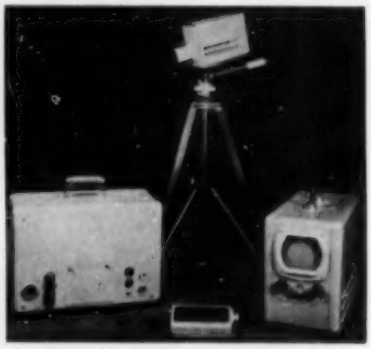
In the same period there were 387 new drive-ins constructed, while 65 were closed permanently or abandoned. About 20 of the new auto theatres replaced closed drive-in operations.

Included in the "active theatre" list, as of July 1, are seasonal theatres and an undetermined number that operate only part of each week. Of the 594 seasonal theatres, 275 operate only in the Winter and 319 only in the Summer.

A state-by-state tabulation of active theatres shows that Texas leads the country with a total of 1,427 of which 465 are drive-ins. New York is second with 1,166 theatres of which 143 are drive-ins, and is closely followed by California with 1,089 theatres of which 195 are drive-ins. Pennsylvania follows with 1,063 theatres of which 214 are drive-ins.

Compact Portable Camera For Closed-Circuit Tv

Wider and wider use is now being made of small portable Tv camera units such as those shown in the accompanying illustration. This is the type of



Portable Tv Camera Equipment

equipment needed on the taking end of a closed-circuit Tv hookup operating within a hotel or industrial plant.

The basic units shown include a camera equipped with a small but sensitive Resistron tube, a tripod, and at bottom from left to right, a portable control panel, a remote control switch box, and a monitor. The camera itself is 8½ inches by 6 inches by 3½ inches, and its tube is small enough to take the standard lenses of 35-mm cameras.

The units shown are manufactured by the electronics division of the Curtis-Wright Corp., Wood-Ridge, N. J., one of a number of manufacturers who produce similar equipment. Combined with portable Tv projectors, such as those made by General Precision Laboratory and the Fleetwood Corp., this camera can be used to carry a show, meeting, or other program from a hotel room to a ballroom, or to hook meeting rooms together in handling overflow crowds.

Paris Technicolor Lab

A complete Technicolor film laboratory has been built at Joinville in the suburbs of Paris and is now operating.

WENZEL NEW INTERIOR LIGHT SHIELD
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To be used in conjunction with the PRO 47.

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SMPTE Technical Courses Begin in Los Angeles

Three courses of instruction for film industry technicians sponsored by the Society of Motion Picture and Television Engineers, in cooperation with the University of California, got underway last month in Los Angeles. The courses are expected to help meet the growing need for trained motion picture technicians.

The three eighteen-week courses on "Motion Picture Laboratory Practice," "Duplication of Color Motion Pictures," and "Illumination Optics" grew out of the cooperative efforts of representatives of universities, labor unions, studios and laboratories to develop a program of technical instruction.

The program is under the direction of Dr. John G. Frayne, of the Westrex Corp., president of the SMPTE, and Sidney P. Solow, of Consolidated Film Industries. The courses will be conducted by acknowledge experts in their fields, and additional courses will be added early next year.

RCA Opens N. Y. Repair Shop

Opening of new facilities in New York City for the repair, modification and overhaul of motion picture projection and other RCA commercial and industrial electronic equipment has been announced by the RCA Service Co., Inc. The shop is located at 419 West 54th St. It supplements present facilities in Camden, N. J., and will serve RCA equipment users in the New York metropolitan area.

Kodak Pro Film Sales Up

Eastman Kodak Co., which this year is observing its 75th anniversary, reports that during 1954 its total sales were $633,457,838, with sales of professional motion picture film accounting for 11% of this total, as compared with only 9% in 1953. Wide gains were registered in color film and Tv film sales.

Better Film Predicted

Lab processing of both black-and-white and color film will soon become much quicker and simpler as as a result of new discoveries in emulsion research, Donald McMaster, general manager of Eastman Kodak, recently reported at the convention of the Photographers' Association in New York City.

Color film quality will improve and color film speeds will eventually become as fast as black-and-white, he said. Many new effects and increased realism would then be possible in color motion pictures. At the Convention, McMaster was made an honorary Master of Photography, the highest award the Photographers' Association can bestow.

DuMont's Tv and Film Camera

Sales of the "Electronicam" are expanding. Film studios and Tv stations throughout the country are now finding wide use for this combination television and motion picture camera developed last year by DuMont Laboratories, it is reported by James L. Caddigan, director of marketing. The Electronicam is able to transmit a live television show and, at the same time, make a photographic record of the show, which can be edited for use by other stations.

Cinerama's Own Production

Anticipating the day when the exclusive right to the production and distribution of Cinerama picures will no longer be the exclusive right of Stanley Warner, Cinerama Inc., has organized its own production department with Lewis Grant Leenhouts at the helm. Although SW retains the exclusive rights to produce and distribute Cinerama picures until the end of 1958, it could lose them if it failed to turn out one Cinerama picture yearly until then.

NEW CEMENT APPLICATOR

Ethyloid's new cement container with rubber-topped glass dropper. To use this bottle applicator, squeeze the rubber top lightly so as to get a small amount of cement in glass dropper, then draw end of dropper over the scraped film edge as you would a brush. Do not squeeze top while drawing dropper across the film for too much cement will spoil the Splice.

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TRENDS IN SHUTTER DESIGN

(Continued from page 19)

its correct position. The set-screws are then tightened, and a finer adjustment effected by manipulation of the shutter-setting knob. This may be done while a film is being projected if the projectionist removes the pane of glass from the observation port and turns off the projection-room lights. Title footage having white letters on a black background may be used as a travel-ghost test film.

More accurate results are usually obtained when the shutter is checked against the intermittent sprocket. The middle of one of the blades should coincide with the middle of the light-beam when the intermittent sprocket is in the middle of the pulldown. In other words, the shutter blade should be exactly half way through the light-beam when exactly 2 teeth of the intermittent sprocket have passed by some fixed point selected as a reference.

Width of Blades

2. ANGULAR ERRORS. A shutter may be "in time" and yet give poor results because the blades are (a) too narrow, (b) too wide, (c) unequal in width, or (d) asymmetrically placed, making one opening wider than the other.

Travel ghosts will flare out from *both* the tops and undersides of bright objects in the picture when the blades are too narrow. The only cure is to widen the blades so that the film is occulted all the time it is in motion.

It should be kept in mind that the theoretical limit of 50% transmission (shutter blades 90 degrees in angular width) can be realized in practice only with the most efficient shutters, such as the conical and cylindrical types. When single-rotor fan-type rear shutters are used it is necessary to employ blade widths of from 99 to 117 degrees (transmission 45% to only 35%), depending on the width of the light-beam where the shutter cuts it.

Shutter blades wider than necessary do not interfere with the quality of the picture, but if they are excessively wide they may waste too much light. The extra loss of light occasioned by having the blades only *slightly* wider than absolutely necessary is inappreciable. To insure top-quality projection the blades of the shutter *ought* to be *slightly* wider than is necessary to eliminate the travel ghost danger!

There are two very good reasons why shutter blades should not be trimmed to minimum width. First, a certain amount of backlash in the gears that run the shutter is unavoidable in many of the older mechanisms. If the blades were originally just barely wide enough to prevent travel ghost, "hunting" of the shutter (alternations of lag and lead) will result in transient travel ghosts which may flare alternately from the tops and bottoms of bright objects.

Trembling of Screen Image

Second, the acceleration-deceleration characteristics of the standard geneva intermittent movement are such that the film moves very slowly at the very beginning and at the very end of each pulldown. If the film is projected to the screen while beginning or ending its movement, either because the shutter hunts or the blades are too narrow for complete occulation, a peculiar vibration, or trembling, of the top and bottom edges of all sharply defined highlights is produced.

This type of image-trembling cannot be seen from the projection room, as a rule, but it is readily perceived by observers positioned nearer the screen. It is often described as a "flickering" of the top and bottom edges of *clearly focused* white areas, and is especially noticeable when titles are shown. The vibration disappears whenever the picture is thrown very slightly out of focus.

A non-animated title on motion-picture film should be as sharp, rock-steady, and free from vibration as a

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for CinemaScope

well-projected lantern slide, no matter how bright the picture may be. Even when all other factors are satisfactory, the presence of edge-vibration, even if too slight to be seen for what it is, imparts to the picture a vaguely sensed "flickery" quality that most observers associate with the conception of a rapidly moving film.

Avoid Excessive Trimming

Because motion-picture projection of the highest quality involves perfect freedom from all flicker, vibration, and travel ghost, complete frame-shift occultation is advocated even at the expense of a few per cent of the available screen illumination. Projectionists, therefore, should avoid trimming their shutters excessively, especially when screen illumination is high. Nothing is gained by shutter-blade trimming except loss of picture quality, for the amount of brightness gained is too small to be perceived.

An example may be given. Suppose that flawless projection is obtained with shutter blades 104° in angular width (transmission 42.3%). The blades are then narrowed down to 101° (transmission 44.0%) in order to gain more light. But actual increase in screen illumination is only 3.9%—not enough to make the picture look brighter. In fact, a light-gain of 5 or 6 per cent is required for a *perceptible* increase in brightness. Nothing has been gained except possible travel ghost or edge-vibration, and the high projection quality formerly enjoyed has been lost.

It is preferable to *lose* 3.9%—or even 6%—of the light by widening the shutter blades to insure steady, flickerless projection even at the highest light levels. Only in drive-in theatres, where light is at a premium, can the projectionist afford to risk the introduction of flicker and travel ghost by trimming the shutter blades beyond safe-and-sane limits. If light is poor and the focus is bad, projection defects cannot be so readily seen.

Unbalanced blades constitute another form of angular error in shutters. If the two blades are of unequal width, or if they are alike but displaced to give openings of unequal angular width, 24-cycle flicker will be added to the normal cutoff frequency of 48 cps. Many of the projector shutters in daily use have been carelessly trimmed at one time or another, creating a condition of imbalance sufficiently great to produce 24-cycle flicker. The angular widths of *both* the openings and the blades should be checked with an accurate protractor.

3. Phasing Errors. It is not likely that the shutter of any commercial projector will be geared to the mechanism *in a wrong gear ratio.* Incorrect phasing is thus never encountered by the average projectionist. It will turn up only in home-made TV projectors in which the regular shutter shaft is wrongly utilized. There are 2 exposures of each frame in optical projection, but in Tv projection there are 5 exposures for every 2 frames—the 2-3-2 sequence of exposures.

4. Rotational Errors. It has been found by experiment that, whenever a symmetrical shutter is rotated rapidly enough to render flicker imperceptible, any sudden change in the speed of the shutter generates an easily seen pulse, or flash, of flicker. The shutter of a motion-picture projector, therefore, must revolve at a constant speed.

In many projectors, especially the older models, the shutter works through a complex system of gears which automatically advances or retards its rotation whenever the picture is framed up or down on the screen, the correct shutter-and-intermittent relationship being maintained at all times.

Backlash of Old Gears

While the complicated shutter gearing may function properly in a new machine, more or less backlash may develop when the gears and bearings become worn. The revolving shutter then "hunts," lagging and leading within a small range of speed variation. If the hunting is smooth and gradual, no flicker will appear, but

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it happens that sudden, although small, speed changes are usually involved. Each change of speed produces a perceptible pulse of flicker which is frequently mistaken for sputtering of the carbon arc.

It is very desirable to minimize hunting of the shutter by replacing all gears and bearings responsible for excessive backlash. In certain older machines, the framing slide and associated lever and spring should be checked for tightness, and end-play removed. Looseness of the spiral drive gear on its flat-faced drive shaft is especially troublesome.

[CONCLUSION]

SMPTE DRIVE-IN SURVEY

(Continued from page 14)

factors are completely different.

The Screen Brightness Committee and the Society of Motion Picture and Television Engineers have had outstanding cooperation from a great many people in the conduct of this survey. Theatre projectionists and their organization, the IATSE, and the theatre managers have been most cooperative in permitting this survey and in assisting Committee members

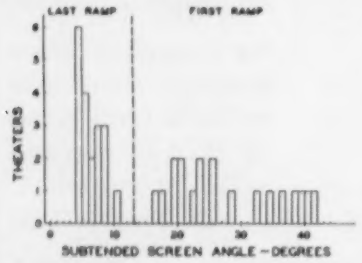

FIG. 10. Maximum and minimum subtended screen angles. Maximum angles for the theatres surveyed were measured from the center of the front ramp, minimum angles from the center of the back ramp.

in obtaining the data. It has been most heartening to observe that all those directly associated with the presentation of drive-in motion pictures have been extremely anxious to help improve the quality of this form of entertainment.

The Committee is particularly appreciative also of the assistance of C. E. Heppberger and others of the

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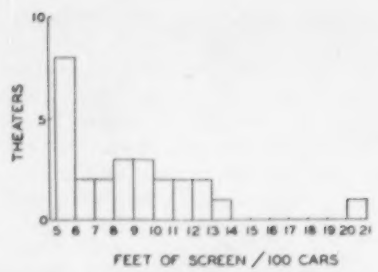

FIG. 11. The relationship of screen width to theatre size is shown. Figures at bottom show the number of feet of screen width for each 100 cars of capacity. It is an indication of past ideas on the size screen appropriate to theatre size.

National Carbon Co. and of the assistance of many members of the Eastman Kodak Co. in carrying out the survey in different areas of the U.S. and in analyzing the information.

THE TODD-AO SYSTEM

(Continued from page 10)

which is already objectionable on a conventional movie screen, becomes intolerable on a large flat screen. Scientists at the American Optical Co. conducted a series of careful experiments to see what squeeze could be tolerated without objection when looking at the screen from an angle. They then studied theatres to see how many seats present an objectionably squeezed picture and which seats give a good picture. In the average theatre twice as many orchestra seats are satisfactory with the Todd-AO curved screen than with a flat screen of equivalent width."

Against Deep Curvature

Questioned on this point, one independent projection expert replied:

"Despite what the AO people say, best viewing of Todd-AO, Cinerama, and all other pictures projected upon deeply curved screens is limited to the middle of the auditorium. Viewed from the side, foreshortening effects vary from one side of the screen to the other, actors on the side nearest the observer looking very thin. There is no way out of this dilemma; and I might say that varying degrees of foreshortening in a picture are more objectionable than a uniform degree, as when a flat-screen image is viewed from the side of the auditorium."

This article is not meant to give a critical view of the finished Todd-AO process. Its purpose is to make available to projectionists such information about the system as is now available, and to point out the very difficult problems solved by the engineers who participated in its design.

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